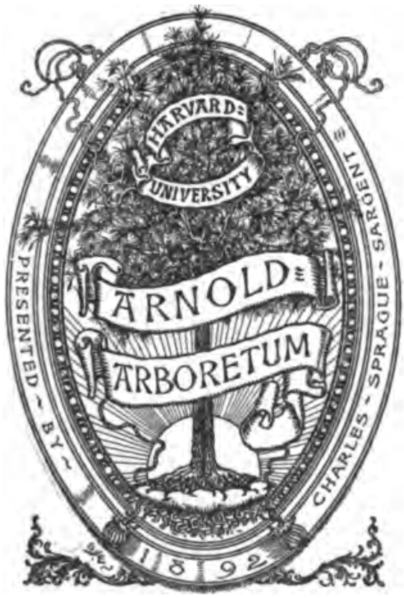
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TORREYA

A MONTHLY JOURNAL OF BOTANICAL NOTES AND NEWS

JOHN TORREY, 1796-1873

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BY

MARSHALL AVERY HOWE

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Vol. 1 No. 1

TORREYA

January, 1901

NOTES ON RUDBECKIA HIRTA L.

BY N. L. BRITTON

In Pittonia, **4**: 174–180, recently published, Mr. Thomas V. Moore, a student of the Catholic University at Washington, working under the direction of Professor Greene, presents a valuable contribution to the arrangement and description of some of the species of *Rudbeckia* of the *hirta* group. In discussing *R. hirta* he takes exception, apparently with good reason, to the statement in Illustrated Flora, **3**: 416, that this plant is native only on the western prairles, and is widely distributed in the East as a weed.

There can be no doubt, however, that the latter portion of this statement is quite true; at the time of publication of Dr. Torrey's Flora of the State of New York, in 1843, the only station for this species known in that State was near Buffalo, where it was collected by Dr. Sartwell; it is now one of the most abundant weeds in grass fields throughout, I think, nearly all portions of the State and is a pest to farmers in many counties, being exceedingly abundant everywhere within one hundred miles of New York City. No indication of its occurrence further east in the northern states is given in the first edition of Dr. Gray's Manual of 1848, where its range is cited from western New York to Wisconsin and southward. In the second edition of Dr. Gray's Manual, 1856, this is supplemented by the statement "also in southern New. York (White Plains), and various parts of New England, but probably of recent introduction." In the sixth edition of Dr. Gray's Manual, 1890, the statement of the first edition is repeated, supplemented by "now common as a weed in eastern meadows, introduced with clover-seed from the West."

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It was the acceptance of the ranges cited by Gray which caused the limitation by me of the native habitat of the plant to the western prairies. I find, however, on reference to Dr. Darlington's Florula Cestrica, that the plant is recorded from Chester County, Pa., in 1826, though it is there said to be not common. In the third edition of the Flora Cestrica, 1853, it is recorded by Darlington as growing in "fence-rows and thickets, not common."

In 1857, Dr. Knieskern records it in his Catalogue of Plants of Monmouth and Ocean County, New Jersey, as occurring in dry fields, not common. In the Catalogue of Plants of New Castle County, Delaware, published in 1844, the species is admitted without question. In Dr. Aikin's Catalogue of Plants of the vicinity of Baltimore, Md., 1837, the plant is said to grow in bushy meadows. According to Dr. Curtis' Catalogue of Plants of North Carolina, 1867, it is said to grow in all the districts of that State. In Dr. Elliott's Botany of South Carolina and Georgia, 1824, it is recorded as growing in dry sandy soil.

It seems to me from the above citations that the point made by Mr. Moore is well taken, and that there is no evidence that the species is not native on the Atlantic sea-board from Maryland or, perhaps, Pennsylvania, southward; that it has, however, been introduced, as Dr. Gray suggested, presumably from the West, into New York and New England, seems from its recorded history, equally certain.

SEEDLINGS OF ARISAEMA

BY D. T. MACDOUGAL

The writer has had the seedlings of *Arisaema triphyllum* and *A. Dracontium* under observation for some time in etiolation experiments and some facts of independent interest have been gathered and are presented here.

The general facts concerning the germination of *A. triphyllum* are familiar and need be recounted only briefly. The cylindrical cotyledon pushes out of the seed coats in about six

weeks after being placed in moist soil, carrying the hypocotyl and plumule. It becomes progeotropic almost immediately upon its emergence from the seed coats and pushes its way down into the soil to a depth of 8 to 10 mm. The basal or outer end of the hypocotyl next becomes slightly enlarged giving rise to one to three roots which penetrate the soil to a depth of 2 or 3 centimeters. These roots are well provided with root hairs in the earlier stages of their existence and later contract to some extent as indicated by the wrinkled epidermis, losing the root hairs previous to this process. This results, of course, in the pulling of the corm downward into the soil, and the repetition of the process in succeeding stages finally buries the adult corm to a depth of 10 cm. or more.

Shortly after root-formation has begun, the first leaf begins to grow, emerging from the cylindrical cotyledon through a rupture near the seed. By the activity of the leaf, carbohydrates are formed, and the third stage of the seedling is marked by the enlargement of the corm until it reaches a size about equal or greater than the seed, and is conical, or globose in form. Almost all of the original store in the seed is expended in the construction of the seedling in the two first stages of development.

During the course of the etiolation experiments, numbers of seeds and plants were divided into two lots, one being placed in the dark chamber and a second in the experimental laboratory. The seeds from an entire fruit of *A. Dracontium* were thus placed in two pots in January. No seedlings being visible in the first week of May the soil was explored to determine the fate of the seeds. To the great surprise of the writer, numbers of seedlings were found which had undergone the development underneath the surface, and those in the dark room were indistinguishable from those grown in the light. In fact, this plant was found to offer a second example of a germination of the seed without development of the plumule, a type of procedure which is followed also by *Arum maculatum* as discovered by Scott and Sargant.*

* Scott and Sargant. On the Development of *Arum maculatum* from the Seed. Annals of Botany, 12: 399–414. 1898.

The cylindrical cotyledon of *A. Dracontium* frees itself from the seed coats and attains a length which varies from 3 mm. to 6 to 7 mm. and pushes down into the soil. Before this extension has ceased, the base of the hypocotyl begins to enlarge and in the case of the shorter cotyledons may bring the resulting corm actually in contact with the seed. Coincidently with the swelling of the hypocotyl the appearance of two or three roots is to be noted. These are furnished with hairs and are highly contractile. In the matter of the development of the plumule the widest variation is shown. In the greater number of instances the plumule is absolutely quiescent during this germination and the formation of the corm goes forward until the seed is exhausted, when the roots go into the contractile state and pull it down into the soil with no showing of a leaf during the first stage of its development. This agrees in the main with the behavior of *Arum maculatum*. In a small number of seedlings of *A. Dracontium*, however, the first leaf may be dissected out as a small body about 3 mm. long, of which half is petiole and the other half a rolled green lamina which reaches no greater development, and never emerges from the cylindrical cotyledon in which it is enclosed. In 9 of the 70 seedlings which came under observation, the first leaf became active before the hypocotyl had doubled its thickness and before more than one root was formed, and extended, forming a petiole 3–4 cm. long and a broad lamina. The seed remains attached to the corm by the cotyledon for an unusually long period and may be seen adhering to the corms formed by leafless seedlings in their first resting period.

The seedlings of *Arum maculatum* and *Arisaema Dracontium* are thus seen to be entirely saprophytic during the first season of their development.

Ignorance of this habit of *A. Dracontium* led the writer to sacrifice a fine lot of seedlings of a hybrid between *A. Dracontium* and *A. triphyllum*. During the first season of the development of these plants only seven plumules were counted and when the second season began thirty plants were found, which led to the belief that the culture had been vitiated and the entire lot was

discarded. Fortunately some drawings had been made which preserved characters easy of interpretation in the light of subsequent discoveries.

NOTES ON THE GENUS LYCOPODIUM

By Francis E. Lloyd

Lycopodium Chamaecyparissus.—Through the courtesy of Mr. D. K. Gilbert, the writer has received specimens of this plant collected at Alder Creek, Oneida Co., N. Y., at which place it grows "plentifully in woods." This establishes the fact of the plant's distribution in this State, from which it was not hitherto reported. "The specimens were gathered in early October, and you will see that the strobiles are old and brown. Those of *L. complanatum* gathered at the same time and place were still yellowish green and show that their time of ripening is much later than that of *L. Chamaecyparissus*," writes Mr. Gilbert. This discrepancy in the time of ripening, first noted by Austin in New Jersey, is an important physiological character distinguishing the two species. Another observed difference is in the position of the rhizome, which in *L. Chamaecyparissus* is underground and in *L. complanatum* prostrate on the surface. Notes by field workers on this point should be made during the coming season.

L. pinnatum.—In August of the past year Professor S. M. Tracy and the writer were collecting in the vicinity of Biloxi, Miss., and a locality was found where this plant grows in abundance, and in perfect form. The horizontal stems are quite prostrate and thin and the leaves are confined to one plane very closely. The habitat is a very wet white or yellowish clay bank with full insolation. In the same spot *L. Carolinianum* was found growing to a good size (18 cm.). There can be no doubt of the distinct specific value of this plant. When it grows in sphagnum bogs, as was found to be the case near Auburn, Ala., a little later in the same season, the plant becomes so spindling and distorted as the result of its struggles in growing through the moss, that it becomes very difficult to recognize it.

L. alopecuroides.—This species also was found in savannahs near Biloxi. In the South the variation of the plant is quite small in amount. The arching of the stem, its thickness (4–5 mm.) and the leaf positions separate it very readily from *L. pinnatum.* Recently we advanced the notion that the presence or absence of reflexion of the sporophylls when ripe would serve to distinguish the two plants, but our observations in the South do not strengthen that view. The plants were, however, not ripe, and further observation is necessary.

L. adpressum.—The validity of this species is still open to some doubt. We found during July last, in bogs near Toms River, N. J., many plants which show the same perplexing variation recently referred to by Clute in the Fern Bulletin (9 : 8. 1901). No plant of the species was found in the South. As the plants of Toms River were by no means mature we hesitate to submit an opinion on them further than to say that forms from New Jersey, hitherto regarded as *L. alopecuroides* and *L. adpressum* are apparently the ends of a series of many intergradations. One point we think settled, namely, that the denticulations of the leaves are of no constant specific value in distinguishing species of this segregate. It is, however, worth while to point out that the plants of the *inundatum* group, from that species to *L. alopecuroides*, including the so-called *adpressum*, are to be regarded as a series of forms in a plastic condition. They seem also to be very susceptible to small changes or differences in the environment. It becomes necessary, therefore, to study them very carefully in the field, and full series of specimens should be collected with differences in habitat carefully noted. One way in which some useful work might be done by those who are in favorable conditions would be to exchange growing plants, say of *L. inundatum* and *L. alopecuroides* and to determine by cultivation in different environmental conditions whether they vary toward each other. It is also of great interest to note that the segregate has in the Old World, so far as known, only one representative, *L. inundatum.*

THE SUMMIT FLORA OF KING'S MOUNTAIN AND CROWDER'S MOUNTAIN, NORTH CAROLINA

BY JOHN K. SMALL

A few miles north of the southern boundary of North Carolina and many miles east of the Appalachian Mountain system, is an irregular ridge with a northeasterly and southwesterly trend. From most adjacent points this ridge is not conspicuous; in fact, it might be passed unobserved were it not for the two peaks which rise abruptly near its northeastern extremity. These peaks are known as King's Mountain and Crowder's Mountain.

The geology of the region in question is quite similar to that of the nearest portion of the Blue Ridge, while neither peak reaches an altitude of quite 1,800 feet. The top of King's Mountain is a little higher above the level of the sea than that of Crowder's Mountain.

I have visited this locality several times and have found interesting, rare and undescribed species; but it is the character of the vegetation inhabiting the summits that especially impresses one.

The summits of both mountains are small and very rugged; that of Crowder's is somewhat larger and less rugged than that of King's Mountain. On ascending the slopes of either mountain two striking features arrest the eye. They are the prevalence of a very local species which has taken the name of one of the mountains, namely *Lacinaria Regimontis*, and of the relatively rare fern, *Asplenium Bradleyi*. The main peculiarity in connection with this fern there, is that it does not confine itself to its favorite habitat, namely, overhanging cliffs; but it is, or it was up to the time I last visited the locality, very common and grew nearly everywhere, on cliffs, on ledges, on and about boulders and in loose soil.

The vegetation of the summits is almost exclusively of woody plants, and shrubby. The shrubby condition of normally large forest trees presents an extraordinary and interesting aspect. The chestnut tree, *Castanea dentata*, ranges from three to six

feet in height, nevertheless these plants produce an abundance of fruit. *Sassafras*, *Pinus Virginiana*, *Quercus Prinus*, *Diospyros* and *Oxydendrum*, all appear in the same form and stature. The common sour gum, *Nyssa sylvatica*, in like condition, exists on King's Mountain, and a single shrub of *Ilex opaca* was found on the uppermost cliffs of Crowder's Mountain.

The normally shrubby plants appear more natural. *Polycodium stamineum*, *Vaccinium vacillans* and *Quercus nana* are common to both peaks, while *Kalmia latifolia*, *Rhododendron Catawbiense*, *Gaylussacia frondosa*, *Gaylussacia resinosa* and *Batodendron arboreum* are species apparently confined to the top of King's Mountain. Only two perennial or shrubby herbs, namely *Galax aphylla* and *Paronychia argyrocoma*, exist on the summit of King's Mountain, while the summit of Crowder's Mountain is destitute of herbaceous vegetation with the exception of a fern and a few sterile plants of some sedge.

A SIMPLE DYNAMOMETER

By H. M. Richards

It is instructive to demonstrate that force is exerted by the swelling of seeds previous to germination, or, for that matter, in the imbibition of water by any substance capable of taking it up. A very simple machine for registering approximately the amount of energy involved, which perhaps may be dignified by the name of a dynamometer, is found in one of the ordinary self-registering letter scales which work by compression. A dish containing the seeds is placed on the pan of the scale, and on top of them is laid a cork, or better a glass plate, which just fits into the glass vessel without binding. The whole is placed on a retort stand and a stick, held firmly by a clamp, is placed against the glass plate. Water is now poured on, and as it runs down among the seeds they swell, and the glass cover being rigid the scale itself is depressed as a result of the pressure. It is needless to say that the weight of the dish, seeds, etc., must first be recorded. In this way an idea of the amount of force exerted by a given weight of

seeds can be obtained. It is not of course very accurate or strictly quantitative, but it is at least approximate, and suitable for comparisons, say between living and dead seeds.

The dials of these scales, as obtained in this country, are graduated in ounces, but it is not difficult to substitute a pasteboard dial and regraduate it in grammes by means of weights placed on the scale pans. This is of course preferable. The construction of these scales is so simple that there is no reason why a home-made and weaker spring could not be substituted for the one provided, and in such a manner an apparatus capable of more delicate adjustment could be obtained. With a more sensitive balance the force exerted by the downward growth of the root tip of *Vicia Faba* could be recorded.

THE RARE MOSSES OF BASHBISH FALLS

By Elizabeth G. Britton

Bashbish Falls may be reached from the Copake station of the Harlem Railroad, by a short walk, and are about one hundred miles from New York City. They are situated in a picturesque ravine with steep walls of rock and wooded slopes surrounding them. Many interesting mosses have been collected in the two expeditions which I have made to this locality, the rarest of which is *Anomobryum concinnatum*, this being the third station recorded for this species in the State. *Didymodon riparius* was collected by Mr. Williams in the stream above the Falls and on the wet cliffs were found *Didymodon rubellus*, associated with *Gymnostomum rupestre*, *Amphoridium Lapponicum*, and *Myurella Careyana*, all rare species for this region, but finding congenial moisture and shade in this sheltered ravine. *Homalia Jamesii*, *Porotrichum Allegheniense*, *Pogonatum alpinum* and *Forsströmia trichomitria* growing on wet rocks, were also collected above the Falls, and the slopes on the south side yielded *Hylocomium brevirostre* and *Dicranella heteromalla* with curved pedicels. Fine fruiting specimens of *Bryum proliferum* were also found in the region.

ECONOMY IN NATURE

By P. A. Rydberg

Rising "on stepping stones
Of their dead selves to higher things."

On Faitoute Avenue in New Orange, New Jersey, used to stand an old cherry tree, seven or eight feet in circumference. About seven feet from the ground it divided into two trunks. Just at the junction of the two there was a big hole, indicating that the tree was decayed and hollow. Nothing of peculiar interest about this tree was revealed, however, until the severe storm came in the spring of 1899, when one of the two trunks was torn down. The hollow trunk contained several bushels of cherry-pits and mulch, produced by decayed cherries and leaves. An adventitious root had sprung from the margin of the hole, ramified in this mass of decayed matter, and grown to the size of the thickness of one's wrist. Not satisfied, however, to feed only on old cherries and leaves, it had sent numerous branches into the decayed portion of the trunk, and the tree was actually feeding on itself, like the old wolf which, according to the fable, was eating its own frozen legs.

REVIEW

A "Flora of Vermont,* a list of the fern and seed-plants growing without cultivation," prepared by President Ezra Brainerd, Professor L. R. Jones and Mr. W. W. Eggleston, a committee of the Vermont Botanical Club, was issued in December, 1900. This list represents much careful and painstaking work on the part of the authors and their associates, involving a thoroughgoing revision of previously published lists of Vermont plants. The spirit in which the work has been conceived is revealed in the following words from the preface: "In every case where a name is admitted to the main list, there is an authenticated specimen deposited in one or more of the permanent herbaria of the state, or

* Brainerd, Jones and Eggleston. Flora of Vermont, a list of fern- and seed-plants growing without cultivation. 8vo. Pp. i–xii; 1–113. Burlington, 15 D. 1900. [Extracted from Twentieth Vermont Agricultural Report.]

in such other herbarium as is indicated in the accompanying note. The invariable rule has been to admit no name which has not an extant specimen back of it. This has necessarily led to the exclusion of a number of names of plants reported by earlier botanists. In many of these cases the evidence is such as to leave little doubt that the plants actually occurred as reported, and probably many of them will be rediscovered. The names of such plants are included in a supplementary list at the end of the main catalogue, and each name so appearing should be considered as a challenge to the sagacity of present botanists until the plant is again found." The main list includes a total of 1,563 species and varieties of Phanerogams and Pteridophytes. The Engler and Prantl sequence is adopted, but the nomenclature is essentially that of Gray's Manual and of the Kew Herbarium. Whatever may be our differences of opinion as to the claims of usage and expediency in nomenclatural matters (any appeal to ethical grounds being logically denied to us who accept an initial date for nomenclature), it certainly seems a violent perversion of botanical history to retain longer for one of our common ferns the generic name *Dicksonia*, a name, which, so far as the Pteridophytes are concerned, was first applied to two species of ferns so different from ours that now, by common consent, they are placed in an entirely different family. Even Sir William Jackson Hooker,* a prince of "conservatives," once wrote, "The name of *Dicksonia* surely, however, ought to be preserved to the original *D. arborescens* (*Balantium* Kaulf. * *)," and this position is maintained by Diels in the Engler and Prantl Pflanzenfamilien and by other modern writers. From an international standpoint, the attempts to preserve two Dicksonias in two different families of ferns are likely to prove a little confusing.

Those who have seen *Lycopodium Chamaecyparissus* growing side by side with *Lycopodium complanatum* and so distinct as to be readily distinguished at a distance of several feet and showing not the least tendency to intergrade will be very sceptical as to the propriety of considering it a variety of *L. complanatum.*

At the close of the work are shorter lists, representing the more important regional floras, in which we see an expression of the

* Hooker, W. J. Genera Filicum, *pl. 61 A* [text].

commendable and increasingly popular modern tendency to study plants particularly in relation to their surroundings. The pamphlet is attractively printed and is most fittingly dedicated to the well-known botanical collector, Mr. Cyrus G. Pringle. The Vermont Botanical Club is to be congratulated upon the enthusiasm and enterprise which have resulted in the publication at this time of such an important addition to the list of American local floras. [M. A. H.]

NEWS ITEMS

Professor Francis E. Lloyd, of the Teachers College, Columbia University, is soon to take a half year's leave of absence. He will spend the time in the laboratory of Professor Strasburger at Bonn.

The *Asa Gray Bulletin* and the *Plant World* have effected a consolidation, retaining the name of the latter. The place upon the editorial board which was to have been filled by the late Thomas A. Williams of the *Asa Gray Bulletin*, will be taken by Mr. Cornelius L. Shear.

Dr. William A. Murrill, whose valuable paper on "The Development of the Archegonium and Fertilization in the Hemlock Spruce (*Tsuga Canadensis* Carr.)," has recently appeared in the *Annals of Botany*, is now Instructor in Biology in the Boys' High School, New York City. Dr. Murrill received his degree from Cornell University.

The last annual meeting of the Society for Plant Morphology and Physiology was held at Baltimore, December 27th and 28th. The presidential address, entitled "A Decade of North American Palaeobotany," was given by Professor D. P. Penhallow, of McGill University. Among the papers presented were three by Dr. D. T. MacDougal, with the following titles: "Critical Points in the Relation of Light to Plants," "Propagation of *Lysimachia*," and "Germination of *Arisaema*." An account of "The Insular Flora of Mississippi and Louisiana," illustrated by lantern views, was given by Professor F. E. Lloyd. Dr. Erwin F. Smith was elected president for the ensuing year, and Professor W. F. Ganong, secretary-treasurer.

Vol. I No. 2

TORREYA

February, 1901

THE VALUE OF FORESTRY IN A COURSE OF NATURE STUDY

By Elizabeth Carss

Until very recently, little or no attention was paid to the care of our forest trees or to the relation of our forests to water supply and soil preservation. Forests were cut only for immediate gain with no regard to future productiveness. Tracts of land were also carelessly burned and no means taken to prevent such occurrences. The consequence is that many districts once covered by forests are now barren wastes of stumps. Farms are often seen where a good wood patch has been so reduced as scarcely to provide the household fuel. I recall one farm in northern New York where the only plot of woodland that the farmer possessed has been almost entirely cut away within the last five or ten years. At first, as the wood was abundant and the farmer felt no particular need for economy, the cutting was done in a most wanton manner. Tall stumps forty and fifty inches in height have been left, and great tree trunks have been felled and left to decay, often crushing small trees in their fall. In the same region there are two striking examples of hillsides that have been cut and burned to the ground to form "pasture." The result is scarcely satisfactory even for sheep. The soil at best was very scant and the hard rock ledges formed uneven masses to which soil could not cling without the aid of vegetation.

It is not difficult to find many illustrations of such destruction as has been described, which is the result of ignorance and con-

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sequent short-sightedness. Attempts are now being made to awaken the private owner to the necessity of care and proper management of forest areas, both for his own sake and for the interests of the country. The Division of Forestry of the Agricultural Department at Washington is making efforts to instruct owners of forest lands and to aid them in the care and preservation of such areas. To this end the Division has undertaken to provide a series of practical examples of improved treatment of private forest lands. The object of the undertaking is to show, by assisting a few owners to make a trial of new methods, that improved ways of handling timber lands are best for the owner and forest. The results of these experiments with private lands are to be published for the benefit of all.

In order that a reform may become vital in a country like this, it is necessary that the means of reform should reach not only those who are directly interested, but the many who influence the legislation of the country. The majority of people know nothing of the valuable government publications on the subject, nor appreciate the expenditure necessary for experimentation and publication of results.

How can the school aid in establishing among the people a proper estimate of the importance of the forests? We often hear that the aim of the school should be to promote social efficiency. To this end children are given calculations and illustrations from the life of trade and commerce, and are taught the ins and outs of a complex political life. While the value of this may not be disputed, there is here presented a very vital question in which both city and country children should be interested.

Elementary work in forestry may be approached through two parts of the school curriculum: geography and nature study. The subject may be introduced by simple study of trees. With very little children, only the recognition of some of the common trees by means of form, leaves, fruit and blossom, is possible. Later, the work may be expanded somewhat as suggested in the following outline originally prepared by the writer for the Teachers College Record:

I. Special tree study.

General form : branching, height and breadth of the tree.

Bark : Characteristic appearance. Does the tree shed the bark ?

Compare bark of the tree studied with other common trees.

Compare the bark of the needle-leaved trees with that of some of the broad-leaved trees.

Leaf : Compare the form with other leaves that have been studied. How is the leaf fastened to the stem ? Where are the leaf buds for next year ? Make a careful study of buds with their wrappings. When do the leaves fall and what changes take place in the leaf before its fall ?

Fruit : How fastened to the stem ? Where most abundant on the tree ? Kind of seeds produced by the tree ?

Germination of seeds : Recognition of seeds of the common trees. Allow the seeds to sprout and examine stages of growth. Brief account of nourishment and growth of trees.

Twigs : Prominence of certain buds and smallness of others. Development of buds on different parts of the twigs ; size, shape, color of buds ; shape and character of bud scales. Scars on the twigs. Leaf scars ; bud scars. Annual growth as shown by external markings ; compare growth of different years. Growth and development of branches.

II. Field work. Recognition of individual trees at different seasons. General outline for field work : difference in height of trees ; difference in foliage masses ; advantage of different types growing together ; trees that have the greatest number of branches ; results of crowding ; method of making a tree grow with a tall, straight trunk ; the effect upon the wood if numerous branches are allowed to develop ; method of cutting and pruning.

III. Care of trees and forests. Some ways in which destruction of forest areas has come about ; fires, careless cutting, etc., insect pests, fungus growths. Ways of preventing destruction.

Let some pupil write for pamphlets. Discuss the efforts that are being made to save the trees and forests. Compare our forest tracts with forest areas in Europe.

IV. Wild life in the woods. Make a list of some of the wild animals seen in the woods in which we have been, and speak of their interesting characteristics, enemies, means of protection, etc. Life in winter, snow tracks. Hunting centers of the United States.

V. Lumbering.

1. Lumbering regions and forest reserves : Where situated in

the United States? Characteristic trees of different regions. Relation of water supply and forests. Control of erosion by forests. The effect of extensive cutting upon distribution of soil. Examples of excessive erosion and excessive deposition of soil.

2. Lumber camps: Sites chosen—reasons. Why winter is a good time for cutting and hauling. Transportation from lumber camp.
3. Saw mills: Situation; power used for operation; ways of preparing wood.

VI. Woods. Examine woodwork in the school room. Notice the different grain found. What is the grain of wood? Why do pieces of wood differ so much in grain? Examine small logs of different woods cut in cross, longitudinal and radial sections. Growth of wood—meaning of rings in the wood; green layer under the bark; injury caused by girdling trees.

It is not supposed that this outline can be carried out in all schools, but it is believed that many valuable lessons can be given along such lines of thought as are here suggested. The work as it stands is very comprehensive and is intended to be distributed throughout a course of nature study and geography.

A large part of this has been in use in the Horace Mann School in New York and has been found of great interest to the boys and girls, and it is hoped that such study in the schools will lay the foundation for an intelligent interest in the problems of forestry in the United States, and thus aid in checking the destruction which has already attained alarming proportions.

A NEW HYGROMETER SUITABLE FOR TESTING ACTION OF STOMATA

By D. T. MacDougal

Light, temperature, electricity, mechanical shock, moisture of the soil, salts in the soil, humidity of the air, winds, and prolonged darkness, exercise an influence upon the guard-cells of stomata in such manner that the pore is closed or opened when

any one of these forces acts with increased or decreased intensity upon the plant. The behavior of stomata to these factors is exceedingly various however. Thus some stomata open when the leaf is placed in water, while others close; some stomata open in light, while others close under the effect of the sun's rays. Again, weak electric shock gives rise to one result, while a strong shock exercises the reverse action.

Any study of stomata by which their action is observed by means of a microscope will be vitiated with many errors, because in taking the epidermis from a leaf and mounting it for examination, stimuli are set up, which may cause the stoma to open or close before its original condition can be observed.

Practically all of the water given off by a leaf in transpiration passes through the stomata in the form of vapor, and the best method of ascertaining whether the stomata are opened or closed is to use some means of detection of watery vapor. This may be done in two ways, viz., by the cobalt method, in which paper saturated with cobalt nitrate placed on the leaf changes from a bluish to a reddish color in the presence of watery vapor; the second method consists in the use of a hygrometer. Several types of these instruments are in use in physiological laboratories. In one the variations in length of a strand of human hair with the changing humidity moves a lever carrying a pen which gives a constant record of the proportion of watery vapor in the air. This form has not been made suitable for testing the action of leaves. Another hygrometer consists essentially of an awn of some grass, like *Stipa*, which twists or untwists with the variations in humidity of the atmosphere. This type has been found very useful in some forms of investigation. A third form contains a thin strip of some material which curves and straightens with the varying humidity, and the best example of this type is the horn hygrometer of F. Darwin, in which the sensitive material is made of a thin strip of pressed horn. The simpler forms of hygrometer sold in the market for general use have a sensitive strip composed of two layers of material of different hygroscopicity, and the writer has devised one for testing the action of stomata which is based upon this principle. It may be made as follows:

Secure a straight piece of iron or copper wire 2 mm. in diameter and 25 cm. long, and bend a section 8 cm. long at right angles. Thrust this short arm through the axis of a cylindrical cork 15 mm. long and 8 mm. in diameter and bend the terminal 5 cm. at right angles and parallel with the long arm. Cut a strip from a developed film plate, such as are supplied by photographers, 8 cm. long and 5 mm. wide. Cut a slit in the cork parallel to the axis and thrust one end of the film in the slit. Now fasten a bristle 5 or 6 cm. long to the free end of the strip of film, which should have its convex surface uppermost. Bend the free end of the long arm of the wire upwards and at right angles, affixing a cork to the tip to which a suitable scale may be attached with glue (Fig. 1, *D*). Turn the cork on its axis until the strip would lie within 2 mm. of any surface on which the apparatus might be placed; note the position of the pointer, and place on the under surface of leaf which has been laid on a table upside down. If the stomata

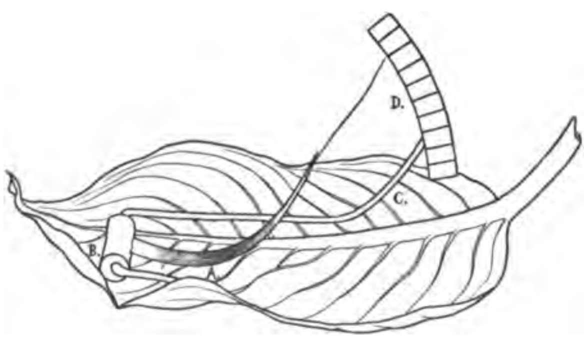

FIG. 1. Differential hygrometer. *A*, strip of film. *B*, cork. *C*, portion of wire bent upward to hold scale. *D*, scale over which the indicator has moved two divisions showing open stomata in the leaf on which the instrument rests. (Illustration from "A Practical Text-Book of Plant Physiology," by MacDougal, now in press. By permission of Longmans, Green & Co.)

are open the gelatine of the film will absorb watery vapor instantly and the strip will begin to straighten so that a movement of the indicator may be noticed inside of ten seconds. Set the hygrometer aside for a few minutes and place on the opposite side of the leaf. If it is free from open stomata no movement will be seen.

The instrument is extremely delicate and care must be taken not to blow the breath upon it while making a test, and the transpiration of the hand will give a decided reaction. Leaves attached to the plant may be tested both indoors and outdoors. It is believed that this instrument is free from most of the faults ascribed by F. Darwin to the horn hygrometer devised by him, and is quite as accurate and sensitive.

THE LYGODIUM AT HOME

By Frederick H. Blodgett

In Middlesex County, New Jersey, the climbing fern [*Lygodium palmatum* (Bernh.) Swz.] occurs in considerable abundance. The several localities are quite similar in general conditions, and a description of one will serve for an average of all.

The most accessible spot where it is found abundantly is a few miles south of New Brunswick, in the edge of the sandy area known as "the burnt woods." This is a tract of low hills and shallow hollows covered to a large extent with various scrub oaks and laurel. Many of the hollows contain water, either as nearly stagnant ponds, or as bogs of sphagnum and other aquatic plants. It is in one of these sphagnum bogs that the *Lygodium* grows.

Swamp maples and other water-loving trees surround the bog, giving place to the lower forms as the edge of the peat is reached, so that the surface of the sphagnum is nearly free from shade during the greater part of the day. Near the west end of the bog there are three colonies of *Lygodium*, a small one at the southwest, another at the northwest, and the third at the apex of a triangle, nearly equilateral, formed by the three. The fern grows among and entwines the low shrubbery and stout herbaceous plants forming the border of the sphagnum area of the swamp.

The largest colony is that in the northwest corner of the swamp. Here, on the 22nd of last December, the stems of golden-

rod and similar plants were closely entwined by the coils of the fern for nearly four feet from the ground. The fruiting pinnules were very abundant and formed nearly half the length of the fronds. Six or more fronds were often twined about the same stem, forming a loosely coiled rope. The pinnules of such masses would make the diameter of the whole reach three or four inches—a dense cluster of fine brownish lobes, contrasting with the brighter green of the less dissected and fewer sterile pinnules lower on the stem. Following the slender fronds downward, the dark brown rootstocks are found covered with about an inch of moss and leaf-mould, among the roots of the plants which support the fronds. The rootstocks, which usually bear only a few, from one to three, fronds, are often branched, throwing off one branch at a time, and they persist for a number of years, so that a length of a foot or more is not rare.

While the plants appear to require abundant moisture, they are not common in the sphagnum of the swamp, but are confined quite strictly to the growth of stout herbaceous plants and low shrubs along the bog margin, or on islands of similar growth in the midst of the sphagnum.

The large colony just described covers about a square rod at the edge of the bog, but extends through the undergrowth for a considerable distance from the open swamp. Along the sides of a drainage ditch it is quite luxuriant but does not equal the more exposed plants. Here the soil has only a thin layer of moss and leaf-mould upon it, the rootstocks being more directly in contact with the wet sand below. In some portions of the swamp area there are clay beds, but the *Lygodium* has not been observed in their immediate vicinity.

The sterile pinnules of the climbing fern were almost grass-green on December 22nd, but the fertile ones were turning brown. Nearly all other foliage had been killed and browned by the severe frosts, so that the color of the fern was in striking contrast to its surroundings. But conspicuous as its color was, it was not easily seen until close at hand, owing to the mass of dead sedge stalks, of golden-rods and briers in the midst of which the plants are located.

A NEW SENECIO FROM PENNSYLVANIA

By N. L. Britton

In the course of a field excursion of the Torrey Club and the Philadelphia Botanical Club on May 29, 1899, at Penn Valley and Tullytown, Bucks Co., Pa., my attention was called by Mr. Joseph Crawford to a *Senecio* growing in abundance in a marshy meadow at Tullytown, which seemed different from any described species. The plant was in full flower at the time and its bright yellow rays were a conspicuous feature in the landscape. Ripe fruiting specimens were secured from the same place by Mr. Crawford on June 6, 1900.

The locality had already been considerably explored by the Philadelphia botanists and is interesting from the large number of pine-barren plants which inhabit it, the soil being very sandy.

The new species resembles both *Senecio Balsamitae* Muhl., of dry soil, and *S. Robbinsii* Oakes, of northern meadows, but is, I think, distinct from either. I append a description.

Senecio Crawfordii.—Perennial, with slender thread-like roots, glabrous, or with sparse woolly pubescence below. Stem slender, about 4 dm. high : leaves thick, firm, the basal ones erect, the larger 2–2.5 dm. long, the blades oval, oblong, or some of them narrowly obovate, mostly not more than one-half as long as the slender petioles, sharply and nearly equally serrate from the acute or obtuse apex to the entire cuneate base, or the lower teeth somewhat larger than the upper ; stem leaves lanceolate or narrower, mostly acuminate, incised-serrate, clasping, the upper sessile, the lower petioled, the uppermost very small : heads 3–7 ; peduncles 1.5–10 cm. long, slender, bracted, rarely forked ; involucre 7–9 mm. high, its bracts linear-lanceolate, acuminate, 1–1.5 mm. wide, shorter than the white barbellate pappus ; rays 8–10 mm. long ; achenes linear, striate, 2.5 mm. long, 0.5 mm. thick.

Type specimens in herbarium of the New York Botanical Garden.

ROSELLINIA OVALIS (ELL.) SACC.

By William A. Riley

Mr. Ellis has described* under the name *Sphaeria ovalis*, a pyrenomycete occurring on *Artemisia* in Utah. Specimens were issued as No. 896 of N. A. F. A careful comparison of these with specimens of *Rosellinia pulveracea* (Ehr.) shows no essential differences and has led me to question the validity of the species.

In North American Pyrenomycetes, Mr. Ellis says regarding the new species: "Closely allied to *R. pulveracea*, differing principally in its perithecia." A careful study of the two species reveals individual perithecia of each which correspond perfectly. Those of *R. pulveracea* are in some cases subovate, while, on the other hand, those of *R. ovalis* are sometimes subglobose. Even in the descriptions there is not brought out any marked distinction. As an aid to comparison, I tabulate Ellis's descriptions of the two species:

Rosellinia ovalis (Ell.) Sacc.	*Rosellinia pulveracea* (Ehr.) Fckl.
1. Perithecia gregarious or subcaespitose.	1. Perithecia densely gregarious, often forming continuous crustaceous layer and *sometimes scattered.*
2. Ovate.	2. Ovate-globose.
3. Rough.	3. Minutely tubercular-roughened.
4. 250–300 μ in diameter.	4. One-third mm. in diameter.
5. Ostiolum obtusely papilliform.	5. Ostiolum papilliform.
6. Asci cylindrical, 60–65 $\mu \times$ 6 μ.	6. Asci cylindrical 60–70 $\mu \times$ 10–12 μ.
7. Stipe 15–20 μ.	7. Stipe 20–30 μ.
8. Spores short-elliptical to oblong, 8–12 $\mu \times$ 5–7 μ.	8. Spores elliptical, 8–15 $\mu \times$ 6–9 μ.

The above table shows some little distinction in size of asci

* Bull. Torr. Club, 8: 125. 1881.

and spores. The unimportance of these characters, unless very marked, is quite generally recognized by workers on this group and has been frequently emphasized. An instance is afforded by a series of measurements of asci and spores of *R. pulveracea* from the various exsiccati. In these Mr. Ellis found a variation from 60–70 $\mu \times$ 8–10 μ in asci and from 6–8 $\mu \times$ 5–6 μ to 10–12 $\mu \times$ 7–9 μ in spores. My measurements of the same species show a variation from $70 \times 7\,\mu$ to $90 \times 13\,\mu$ in asci; from $10 \times 7\,\mu$ to $15 \times 10\,\mu$ in spores. For *R. ovalis*, Ellis's measurements, as seen above, are 60–65 $\mu \times 6\,\mu$ for asci; 8–12 $\mu \times$ 5–7 μ for spores. I find asci as large as $85 \times 7\,\mu$, spores 10–12 $\mu \times$ 6–7 μ. From a comparison of these figures it may be seen that on the basis of asci and spores we cannot even approximate a separation of the two species. It is my belief that *Rosellinia ovalis* (Ell.) is, at most, but a variety of *R. pulveracea* (Ehr.).

It should be noted that Saccardo attributes this species to New Jersey, whereas, it has so far been reported only from Utah. Misled by the statement "on sage-brush" he doubtfully refers to the host as *Salvia*.

BOTANICAL DEPARTMENT, CORNELL UNIVERSITY.

NEWS ITEMS

The sixth annual winter meeting of the Vermont Botanical Club was held in Burlington, on January 25th and 26th. Fourteen papers were presented.

"*The Gamophyllous*, a monthly magazine devoted to plant life in field, forest and garden," is the title of a recently established periodical. It is edited and published by Mr. Harry A. Bird of Plainfield, New Jersey.

An interesting paper entitled "An Ecological Study of the New Jersey Strand Flora," by Dr. John W. Harshberger was issued on December 31, 1900. It is extracted from the Proceedings of the Academy of Natural Sciences of Philadelphia.

Dr. David Griffiths, who received his advanced degree from

Columbia University last June, is now botanist of the Agricultural Experiment Station at Tucson, Arizona. His doctorate thesis, an important paper on the North American Sordariaceae is in press.

The appearance of "A Practical Text-Book of Plant Physiology," by Dr. D. T. MacDougal is announced for May 1st. The book will be suitable for use in the laboratory, will comprise about 350 pages with 150 illustrations, and will be published by Longmans, Green and Company.

Dr. Timothy Field Allen has donated his collection of Characeae to the New York Botanical Garden. The collection represents the accumulations of many years of active interest in this group of plants. It is rich in types and co-types and is doubtless one of the largest collections of Characeae in existence.

"Mosses with a Hand Lens," an introduction to the study of mosses, by A. J. Grout, Ph.D., of the Boys' High School, Brooklyn, is an attractive booklet of 73 pages, issued in December last. It contains descriptions of one hundred of the commoner and more conspicuous mosses in but slightly technical terms, with numerous illustrations.

"The Outline of the Course in Biology" in the Horace Mann School, by Professor F. E. Lloyd and Mr. Maurice A. Bigelow, has recently appeared as Vol. II., No. 1 of the Teachers College Record. The pamphlet contains the detailed outline of the course in botany and zoölogy and will be of interest to teachers of those subjects in high schools.

Mr. J. E. Kirkwood has accepted a position in Syracuse University, where he will take charge of the Department of Botany. Mr. Kirkwood is a graduate of Pacific University, Forest Grove, Oregon. He received the appointment of special Fellow in Biology, Princeton University, for the year 1898–99, on the completion of which he continued his studies at the New York Botanical Garden and Columbia University. His special work has been on the embryology of the Cucurbitaceae and on the food content and digestion in the coconut during germination.

Vol. 1 No. 3

TORREYA

March, 1901

A NEW HORSE GENTIAN (TRIOSTEUM) COMMON IN THE EASTERN STATES

By Eugene P. Bicknell

Notwithstanding that Rafinesque, in 1836, proposed six species of *Triosteum* in addition to the two which had come down from the time of Linnaeus, these two alone continue to represent the genus in our manuals of to-day. There is, nevertheless, a third species, quite a common one, which seems to have escaped recognition as effectually as if it did not exist. Its discovery, now some years ago, was quite a matter of accident, and affords a good illustration of the utility of botanical gardens in the study of our flora.

In the early days of the New York Botanical Garden, while passing through the grounds one Saturday afternoon in company with Dr. Britton, I rather surprised my companion by asking the name of a *Triosteum* cultivated in the herbaceous beds. My own surprise was in turn excited upon learning that the plant was merely the common *T. perfoliatum* L. and I insisted that it was, nevertheless, a species different from the plant with which I was familiar as *T. perfoliatum* and which actually grew in its native state on the grounds of my own home. The cultivated specimen had been brought from Staten Island, near Dr. Britton's home, and the following day an opportunity was found of visiting, under Dr. Britton's guidance, the very piece of woodland from which the plant had been removed. There, in its natural surroundings, we found more of it, and the interesting fact at once developed that it was distinctly later-flowering than the species of my own region twenty miles

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farther north along the Hudson River. The latter had come into bloom some two weeks before, whereas the flower-buds of this Staten Island plant were still very immature. I had never collected the species familiar to me, taking for granted—a cardinal sin in systematic botany—that it was our supposedly well-known *T. perfoliatum*, the only red-flowered species allowed by the books. Now, however, upon the first occasion, the two plants were carefully compared and it needed no profound study to find out that they were distinct species.

The essential or rather the most obvious difference between the two is seen in the main leaves which, broadly perfoliate in true *perfoliatum*, are in the new species conspicuously narrowed into a merely sessile base. This, however, holds true only of the principal sets of leaves. In the upper leaves a curious reversal of these characters is frequent. In *perfoliatum* the upper leaves are often, or usually, narrowly sessile; in the contrasted plant they are sometimes distinctly connate.

Just here is encountered a difficulty which I have found insuperable in attempting the correlation of any of Rafinesque's descriptions with the present new plant. Parts of most of these descriptions seem to point toward it; other parts seem to have a different bearing. It would appear that Rafinesque must have had the species but there is no certainty in regard to this nor as to the positive application of any of his names. Those which do not refer unmistakably to *Triosteum perfoliatum* or to *T. angustifolium* may refer, for anything which appears to the contrary, either to forms or fragments of *T. perfoliatum*, or to species as yet unknown. In going over the matter with Dr. Britton, we have been able to reach no other conclusion than this. The case seems analogous to that of the genus *Lechea*, about which Rafinesque knew a great deal in a careless and incoherent way or, at least, so set down what he knew, making his descriptions varitable enigmas to us at the present day.

Triosteum aurantiacum sp. nov.—Stem 5–12 dm. tall, glandular-puberulent to weakly hirsute, simple and erect or late in the season sometimes declined: leaves thin, entire or rarely subsinuate, becoming 1.5–2.5 dm. long and 8–10 cm. wide, ovate-oblong to oblong-lanceolate, acute, attenuate at both ends,

or acuminate at the apex and contracted below the middle into a narrow basal portion, sometimes, especially in the upper leaves, the extreme base again slightly dilated and connate, but never broadly perfoliate, green and thinly appressed-hirsutulous above, scarcely paler beneath, except in age, and minutely soft-pubescent: corolla dull purplish-red, 14–20 mm. long, the outer surface glandular-puberulent, strongly gibbous-saccate at base, more distinctly two-lipped and dilated above and with larger more spreading lobes than in *T. perfoliatum*, the stamens relatively much shorter and the style less exserted; calyx-lobes linear, obtuse, the largest becoming 18 mm. long and much surpassing the corolla; fruit 2–6 in each pair of axils, larger and more obovoid-oblong than in *T. perfoliatum*, pubescent, becoming orange to bright orange-red.

From Quebec to Minnesota, Massachusetts, North Carolina, Kentucky and Iowa, growing in rich soil in hilly or rocky woods. Comes into flower about New York from May 9 to 20, two or three weeks earlier than *T. perfoliatum*. The fruit ripens in late summer and sometimes persists well into November.

The type from Van Cortlandt Park, New York City, is deposited in the herbarium of the New York Botanical Garden.

This plant, although greatly resembling *T. perfoliatum*, has many points of difference. Perhaps the most obvious of these results from the shorter internodes of *T. perfoliatum* and its broadly perfoliate leaves which sometimes measure as much as 5–7 cm. across their united bases. *T. perfoliatum* is also mostly stouter and more leafy, the leaves thicker, and more rugose-veiny and paler beneath and more densely soft-pubescent. A closer comparison reveals interesting differences between the flowers of the two species. Not only is the corolla of *T. perfoliatum* often duller in color and decidedly greenish about its lower half, but it is markedly different in shape and in relatively longer stamens and more exserted style; the corolla-tube is nearly cylindric and scarcely at all two-lipped with very short erect lobes scarcely, if at all, surpassing the anthers, in definite contrast with that of *T. aurantiacum*, which is decidedly two-lipped and upwardly dilated with much larger more or less spreading lobes much surpassing the included stamens. Furthermore, the calyx segments of *Triosteum perfoliatum* are ordinarily much shorter and less foli-

aceous than in *T. aurantiacum* and usually narrower and more acute. The fruit of *T. perfoliatum* is commonly more numerous and crowded than in *T. aurantiacum*, mostly 6–8 in each pair of axils, more globose and of a duller yellowish-orange color; at least, I have never seen it of as deep a flame color as that of *T. aurantiacum* sometimes becomes. Apparently also the species prefers a more sandy soil in lower, more level woods and thickets.

I have been unable to make out much difference in the distribution of the two species, although *T. perfoliatum* is perhaps rather more southern in its range. Specimens seen show a range from New York to Minnesota, Alabama, Kentucky and Kansas.

A MODIFIED FORM OF RESPIRATION APPARATUS

By H. M. Richards

There are many methods of all degrees of complication by which the amount of carbon dioxide evolved by plants may be measured. Many are simply out of the question for a laboratory which is not extensively stocked, requiring as they do a great array of glassware, many air-tight joints, siphons, aspirators or what not, while others are very crude. The writer has found the following simple and easily constructed piece of apparatus very useful for demonstrating in a fairly accurate way and on a somewhat large scale the respiration of plants. It is indeed a modification in form but not in principle of a method long used and often figured in many of the text-books. The apparatus referred to consists, as far as the glassware is concerned, of an exceedingly long-necked flask. Such flasks, however, must be specially blown and are consequently hard to obtain and also somewhat expensive. Instead of such a flask, an ordinary Bohemian one of 150 to 200 cc. capacity, with the neck of usual length, is selected. A test-tube, the closed and slightly tapering end of which was just a little too large to slip into the flask's neck, is next taken. By means of a little carborundum or emery-powder it is ground into the flask neck so as to get an air-tight closure, like that of the glass stopper in a bottle.

It may be noted here that carborundum is a very handy grinding material. It is harder than emery and cuts more quickly and may be obtained in any grade of powder from the manufacturers at the electrical works at Niagara Falls. The writer has prepared ground-glass plates of considerable size and has ground covers to dishes, joints in tubes, etc., with a minimum amount of trouble by means of this carborundum.

But to return to the respiration apparatus. The test-tube having been ground into the neck in a satisfactory manner, its end is next blown out, by heating and blowing while in a Bunsen flame. The hole thus produced may be easily enlarged to any size by moulding with a piece of cold metal.

The tube should now be graduated, which may be done by corking up the end of the tube and running in water from a burette, marking on a paper scale glued to the side any graduation—1 or 5 cc.—that is desired. For use, the flask is filled with seedlings, flowers, leaves, or whatever is to be investigated, and a plug of cotton, loosely poked in, to prevent their falling out when the flask is inverted. The extension of the neck is now put with its end (what as a test-tube was its mouth) over mercury. Some strong potash—say 50 per cent.—is run in at the top; the weight of the mercury will be enough to prevent as much, at least, as 5 cc. from running out. The ground joint of the test-tube is now painted liberally with vaseline, or better vaseline and wax, and the correspondingly ground flask joined to it. The whole apparatus is supported by a clamp on a retort-stand over the dish of mercury.

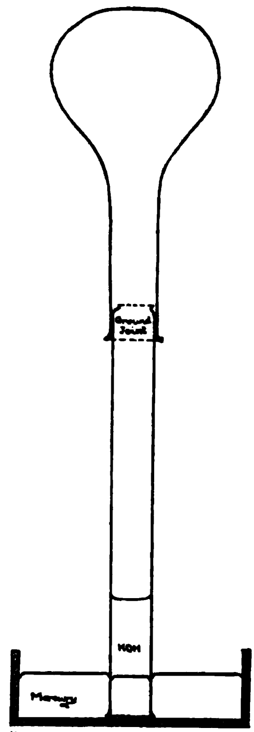

Diagram of Section. The apparatus is supported by a clamp to a retort-stand. The flask is the receiver for flowers, seeds, etc. The tube may be graduated or the results may be read simply by comparison.

You now have such a flask with an elongated neck as is figured in the text-books, but with the advantage that, the neck being in two pieces, the potash can be introduced in the manner described with the greatest ease. As the carbon dioxide is evolved, it, of course, sinks and is absorbed by the alkali, the diminution in volume of the air within the flask being shown by the corresponding rise of the mercury in the neck. The tube being graduated, this absorptión can be readily observed and noted.

The apparatus is so simple and so quickly and cheaply put together, that several may be set up side by side for comparison of the respiration of different plant organs under different conditions. There are certain errors to be guarded against. The rise of the column within the neck should be read from the mercury surface and not from that of the potash above it, since the latter absorbs water as well as carbon dioxide. Great change of temperature should also be guarded against, since it alters the volume of gas within the flask, and to this the apparatus is very sensitive. If the volume of the flask and neck, less the contents, be taken, the proper correction for temperature variation may be applied. There is also an error introduced by the variation of vapor tension due to the possible change of the moisture in the enclosed air, but this is not considerable. Such a union by a ground joint is vastly to be preferred to cutting off the flaring mouth of the flask and uniting it to a tube by a rubber joint. The manipulation of a rubber tube of such size and under such conditions is annoying in the extreme. The ground joint prepared as above and well sealed with vaseline has proved itself to be entirely air-tight.

THRIVING UNDER DIFFICULTIES

By David Griffiths

A sewer pipe three feet underground is not only uninviting but rather an unusual object of botanical study. Yet associated with such a structure on the campus of the University of Arizona, the workmen uncovered one of the most interesting struggles for ex-

istence the writer has seen for some time. The sewer system, which was put in eight or ten years ago, is of a most primitive character, being simply a drain pipe leading from the laboratories into a small ravine which finally finds its way into the Santa Cruz. The pipe consists of short sections of tiling, with no shoulders, placed end to end as closely as circumstances would permit, no cement at all being used on the joints. This pipe was laid about three feet under the surface through a hard calcareous subsoil commonly designated by the Spanish name, *caliche*. After the pipe was placed in position the trench was filled with the white hard chunks of *caliche* together with pieces of brick and scraps of iron and tin, refuse from the construction of the building.

This pipe recently became clogged, necessitating the removal of a large portion of the tiling. While the laborers were excavating, they discovered, just above the pipe and running parallel with it, an unusually large contorted root which excited their curiosity. This proved upon examination to be the root of a Virginia creeper situated at a distance of nine feet from one end of the trench. It had followed the wall of the building as far as the tiling, turned an obtuse angle and then proceeded to follow the pipe across the campus. The débris and hard masses of *caliche* caused it to become exceedingly twisted and contorted, but strange as it seemed to me the contortions were mainly in one plane approximately parallel to the surface. In no instance was the root in actual contact with the pipe, but it followed directly above it at a distance of one to two inches. Laterals, however, were freely given off toward the pipe and in two instances small roots were found actually entering between the joints of the tiling and projecting into the lumen.

The clogging of the pipe was due in a very large measure to the entrance of the roots of plants which penetrated mainly from the top and sides, forming dense mats around all the crevices. All roots, whether isolated or in clusters, were imbedded in a black slimy deposit characteristic of such locations.

There is nothing surprising in the fact that roots in this arid region should penetrate into such a structure as that described

above in search of moisture ; but when we remember that this small pipe, four inches in diameter, drains two chemical laboratories running at their full capacity during the entire school year, a different aspect is placed on the phenomenon. No less than 150 pounds of sulphuric acid alone pass through the pipe during the year. Of course there are solutions of other acids and salts in corresponding quantities. At certain times in the year and indeed at different hours of the day, solutions of poisonous chemicals of considerable density must pass down this pipe and bathe the roots which project into it.

There are probably two reasons why the large root of the Virginia creeper should follow the pipe. It found along this path considerable moisture and but slight resistance compared with the hard undisturbed *caliche* on the outside of the trench. But since we are naturally led to suppose that its main object was a search for water, we may inquire why it did not follow the pipe closely instead of remaining at a distance of one to two inches. The probable explanation for this is that it kept a safe distance from the poisonous chemicals which flow down the pipe and that the small quantities which ooze through the loose joints are reacted upon to some extent by the soil which renders them less harmful. Possibly the laterals which entered the pipe did so at a time when the quantity of chemicals in solution was at a minimum, as is the case during the summer months. One of the rootlets which entered the pipe a distance of half an inch was in apparently a perfectly healthy condition but the other which entered a distance of fully an inch had its end blackened and dead.

The roots which formed a mat around the joints and were the chief agents in clogging the pipe proved to be those of Bermuda grass (*Capriola Dactylon*) a plant which does not appear at all choice with reference to what it drinks, for it is known to thrive in the Southwest in localities where alkali is very abundant. Among other plants growing in the vicinity and which doubtless contributed to some extent to the clogging may be mentioned burr clover, alfalfa and rescue grass.

UNIVERSITY OF ARIZONA, February, 1901.

SYNONYMY OF BURMANNIA AND GYROTHECA

By Roland M. Harper

A few weeks ago I had occasion to look up the synonymy of *Burmannia capitata*, one of the plants I collected in Georgia last summer, and found the following facts of interest in connection with it.

In Heller's Catalogue of North American Plants, both editions, the name of this species is cited as *B. capitata* Chapm. But Dr. Chapman was not the original author of the species, for in his Flora of the Southern States, all editions, he gives as a synonym *Tripterella capitata* Mx. Michaux based his species on *Vogelia capitata* Gmel., and Gmelin refers to "Walt. flor. carol. p. 69," where our plant seems to have been first described, under the name of "*Anonymos capitat.*"

Having traced the origin of the name back to Walter, it then occurred to me that Dr. Morong a few years ago had published the combination *Gyrotheca capitata*,* based on this same *Anonymos capitat.* of Walter. On examining Walter's description, I noticed that it applied undoubtedly to our *Burmannia*, and had nothing whatever to do with *Gyrotheca*. But on the opposite page (68) I noticed an *Anonymos tinctori.*, the description of which clearly applies to our *Gyrotheca*, and the cause of the trouble at once became evident.

It appears that Dr. Morong in some way got the two names confused, for he says: "It is a little singular that Walter's specific name has been changed into 'tinctoria' by all the writers who have quoted him, from Pursh to Kuntze. The plant is placed by Walter among his 'Anonymo' genera, the term he uses when he is doubtful about the genus, but his description is so full that no one can doubt what is meant." He then cites the correct page, 68, but gives the wrong specific name, *capitata*.

This error seems to have passed unnoticed ever since, having been taken up in the "List of Pteridophyta and Spermatophyta growing without cultivation in Northeastern North America"

* Bull. Torr. Club, 20: 472. D. 1893.

(Mem. Torr. Club, **5**), Britton and Brown's Illustrated Flora, Rhodora (**1** : 68), Heller's Catalogue, and other publications.

In the Kew Index, Walter's *Anonymos capitat.* is correctly referred to *Burmannia*, and the authorship of the combination *Burmannia capitata* is credited to Martius.

The correct synonymy of these two species is then as follows :

BURMANNIA CAPITATA (Walt.) Mart. Nov. Gen. et Sp. Pl. Bras. **1** : 12. 1824.

Anonymos capitat. Walt. Fl. Car. 69. 1788.
Vogelia capitata Gmel. Syst. **2** : 107. 1791.
Tripterella capitata Mx. Fl. Bor. Am. **1** : 19. *pl. 3.* 1803.

GYROTHECA TINCTORIA (Walt.) Sal. Trans. Hort. Soc. **1** : 327. 1812.

Anonymos tinctori. Walt. Fl. Car. 68. 1788.
Dilatris tinctoria Pursh, Fl. Am. Sept. 30. 1814.
Lachnanthes tinctoria Ell. Bot. S. C. & Ga. **1** : 47. 1816.
Gyrotheca capitata Morong, Bull. Torr. Club, **20** : 472. 1893.

Several other synonyms for the latter are given in Dr. Morong's paper.

COLUMBIA UNIVERSITY.

TRANSPIRATION OF RUST-INFESTED RUBUS

BY FREDERICK H. BLODGETT

On May 23d last, two branches of *Rubus* sp. were cut from adjacent plants. The branches were as nearly alike in size and number of leaves as possible, but one was healthy, the other badly rusted (with *Gymnoconia interstitialis*). Fifteen minutes after cutting they were placed in water. Each had wilted somewhat, especially in the new growth of which there were several inches on each branch. The rusted branch was wilted considerably more than the healthy one. The healthy specimen revived when placed in water, the rusted one continued to wilt, the basal leaves only showing any tendency to recover.

On the 24th the test was repeated in a more careful manner. The two branches bore the same relation to one another as before, but they were placed in water immediately upon cutting.

The leaf surface was slightly greater in the healthy specimen, as the normal leaves were larger than the rusted, but the number was nearly equal in the two specimens. Large test-tubes were used, in which the branches were left tightly corked over night. When examined on the morning of the 25th the healthy branch was not wilted, the rusted one was considerably so. The rusted specimen evaporated 42 cc. while the healthy specimen evaporated 23 cc. of water under parallel conditions.

Thus the branch with the rusted leaves absorbed nearly twice as much water as the healthy branch, and yet failed to remain unwilted. The rust covered the lower surface of nearly all of the leaflets almost completely, and the extra demand for water thus imposed upon the plant was equivalent to doubling the leaf surface, as indicated by the volume of water transpired.

NEWS ITEMS

Professor A. S. Hitchcock, of the Kansas Agricultural College, has been appointed Assistant Agrostologist of the Department of Agriculture in the place of Thomas A. Williams, deceased.

A revision of the Crotons of the United States by A. M. Ferguson has recently been issued as a separate from the Twelfth Annual Report of the Missouri Botanical Garden. Twenty-six species and several varieties are described, most of which are also illustrated.

The Yale Summer School of Forestry will hold its sessions this year at Grey Towers, the estate of Mr. James W. Pinchot, near the village of Milford, Pike Co., Pennsylvania. The instruction will be under the charge of Professor Henry S. Graves and Professor James W. Toumey.

Mr. Percy Wilson, Museum Aid at the New York Botanical Garden, has been sent with the Solar Eclipse Expedition, under the direction of Professor David P. Todd, of Amherst College, to the Dutch East Indies, for the purpose of securing museum specimens, living plants and seeds. He sailed on March 2, by way of the Suez Canal, for Singapore.

One of the latest results of the remarkable activity of American mycologists and mycophagists is "The Mushroom Book" by Miss Nina L. Marshall. It is expected that a review of this will appear in an early number of *Torreya.*

Mr. George V. Nash, Head Gardener of the New York Botanical Garden, has gone to the Royal Gardens, at Kew, England, on the invitation of the Director, Sir W. T. Thiselton-Dyer, for the purpose of selecting duplicate living plants from the Kew collections and shipping them to New York. Mr. Nash will also carry out some studies on grasses in the Kew herbarium.

Five of the papers presented at the meeting of the fern students held in New York City on June 27, 1900, under the auspices of the Linnaean Fern Chapter, have been published by the Chapter in pamphlet form under the collective title of "Fernwort Papers." They are: "The Genus Isoëtes in New England," by A. A. Eaton; "The system of Ferns proposed in 'Die natürlichen Pflanzenfamilien,'" by Lucien M. Underwood; "Experiments in hybridizing Ferns," by Margaret Slosson; "Athyrium as a Genus," by B. D. Gilbert; and "On the Occurrence of the Hart's-tongue in America," by William R. Maxon.

The announcement for the fourteenth season of the Marine Biological Laboratory at Woods Holl, Massachusetts, has recently been issued. The season extends from Wednesday, July 3, to Wednesday, August 14, 1901. The botanical staff consists of Dr. Bradley Moore Davis, Instructor in Botany, University of Chicago; Dr. George T. Moore, Instructor in Botany, Dartmouth College; Dr. Rodney H. True, Lecturer in Harvard University; Dr. Charles H. Shaw, Professor of Botany, The Temple College; Mr. Anstruther A. Lawson, Fellow in Botany, University of Chicago; and Miss Lillian G. MacRae, Curator and Collector in Botany. Copies of the announcement may be obtained of Dr. Bradley M. Davis, University of Chicago.

Vol. 1 No. 4

TORREYA

April, 1901

NOTES ON THE BOLETI OF WEST VIRGINIA

By Henry C. Beardslee

Brookside, West Virginia, is situated in the heart of a mountainous region at an altitude of 3,100 feet. Its surface is much varied and presents all the conditions for an abundant fungus flora, which it was the writer's good fortune to study during the past summer.

Many of the species observed were of great interest to a northern botanist; the Boleti, especially, presenting many forms which are either rare or unknown to our own State of Ohio. In all, nearly forty species were observed. Many of these were common and well known to all students of the group. Some, however, were comparatively rare, and the following notes in regard to them have been collated, as of possible interest to students in other regions.

Boletus auriflammeus B. & C. was one of the first species of interest to be observed. Like all the Pulverulenti, it is very rare, but as all three of our species were originally discovered in the Carolinas, it was with more of pleasure than surprise that it was observed in West Virginia. It grew by preference in dry gravel high on the mountain-sides, and was remarkably arid, being less perishable than any other species observed. It is a small plant, bright golden yellow in color, and thickly covered with a yellow powder, which disappears with age. This powder in the younger plant colors the mouths of the tubes, giving them a distinct orange tint, which contrasts plainly with the remainder of the tubes.

[The exact date of publication of each issue of Torreya is given in the succeeding number. Vol. 1, No. 3, comprising pages 25–36, was issued March 25, 1901.]

This would seem to explain the reference, in the original description, to the scarlet mouths of the angular tubes, which certainly does not otherwise apply to our plant.

Boletus Ravenelii B. & C., another member of the Pulverulenti, was rather more common than the preceding species and almost as striking. It was frequently found with its large fluffy veil intact, and thickly covered with its sepia-brown spores. Its slender flexuous stipe was a marked characteristic of the form at Brookside.

Boletus cyanescens Bull. has been considered a northern species, but it was not rare along the mountain roads. The first specimen observed was just emerging from the bare soil on the roadside. Its yellow tomentum was so characteristic and its appearance so distinct that it was visited daily as it slowly developed, though with no suspicion of its identity. It was afterward found fairly abundant, but always in the clay-banks, along the roads, with which its grayish yellow color harmonized perfectly.

Among the rosy spored species *Boletus alutarius* Fr. and *Boletus nigrellus* Pk. were the most interesting, and *Boletus gracilis* Pk. the most abundant.

Boletus nigrellus Pk. was observed in all its stages and differed so widely from the original description, that it seemed at first distinct. It was at first "blackish" in color, but soon changed to a sordid gray. Its flesh, however, was decidedly not "white and unchangeable," as the entire plant, when handled or bruised, blackened rapidly, the dried specimens being inky black. Professor Peck, who has examined my specimens, pronounces them identical with his species, so that it is evident that the original description must be modified.

Boletus alutarius Fr. grew all summer in turf beneath the same chestnut tree, where it was kept under observation. It is an attractive plant, unlike any of its relatives. In its earlier stages it has a distinct pubescence, but it becomes quite smooth with age.

Peck's two fine species, *Boletus separans* and *Boletus eximius*, were generally distributed on the hillsides, but neither was common. *Boletus eximius* Pk. fell far below the huge dimensions of this species as we have found it in Maine.

Boletus edulis Bull., to our great surprise, was scarcely seen all summer. *Boletus affinis* Pk. was abundant everywhere.

The two species which were most abundant were *Boletus chromapes* Frost and *Boletus bicolor* Pk. The latter species was particularly common along the sandy roads, where its dark red pilei might be seen often in large clumps attracting the eye of every passer-by.

CLEVELAND, OHIO.

REMARKS ON THE USE OF FUNARIA HYGROMETRICA IN BOTANICAL TEACHING

BY MARSHALL A. HOWE

The common cord-moss (*Funaria hygrometrica*) figures so prominently in well-known botanical text-books that little or nothing needs to be said as to the characters by which it may be recognized. It may be remarked, however, that this moss grows by preference on moist sandy soil in either open or lightly shaded places and that it thrives with special luxuriance where such soil has been recently burned over. Though the leaves of the living *Funaria* have long been famed for the beauty and clearness with which their chloroplasts are exhibited, the gametophyte, on account of the shortness of the stem, is perhaps not so well adapted for general study in the laboratory as is that of some of the larger mosses like the Mniums. Yet, for spring classes, *Funaria* may be relied upon to furnish material for the demonstration of living spermatozoids. The clusters of antheridia may be recognized in the living plants with the naked eye or with the aid of a hand lens. They are of a yellowish or brownish color owing to changes in the chloroplasts of the cells composing the walls of the maturing antheridia, and each cluster is surrounded by leaves in such a way that the whole is rosette-like in form. In the region of New York, the antheridia are mature late in April or early in May. As in dealing with fern prothalli, the spermatozoids are set free with greater certainty if the plants are kept rather dry for a day or two before the antheridia are brought into a drop of water for examination.

But certain characters of the sporophyte, notably the beauty of the peristome and the ease with which it may be made to illustrate the hygroscopic nature of moss peristomes in general, are what especially commend *Funaria* for use in botanical instruction. It is, I believe, a sound principle in the pedagogics of natural history to select illustrative material now and then which is bound to excite the interest and admiration of the most indifferent pupil. It can be readily understood that in its abuse this motive might lead to a selection which would interfere with a proper perspective of the subject as a whole, but, in the present case, the features in which the peristome of *Funaria* differs from the type most common in the mosses are of little importance to the general student.

For the best demonstration of the workings of the peristome, the plants should be collected and dried when the capsules are mature and brown and a little before the opercula are ready to fall, which, in the neighborhood of New York, is mostly in June and July. In this dried condition, they may be preserved indefinitely. When the study of the matured sporophytes is begun, some of them, still attached to the gametophytes, may be placed in a glass of water and the student's attention directed to the untwisting of the seta as it absorbs the water. Then, on holding one of them in the air a few moments, the seta is seen to twist again. These movements of the seta under changing conditions of moisture were, with little doubt, what suggested the specific name *hygrometrica* to Linnaeus. Finally, the probable relation of these movements to the dispersal of the spores may be suggested to the student if he fails to think of it himself. The amount of soaking required to remove the operculum depends largely on the degree of maturity of the capsule at the time of gathering. The act of throwing off the operculum and the relation of the annulus to the process can best be observed if a few capsules are placed in a large drop of water on a glass slide or in a shallow watch-glass. After the removal of the operculum and annulus, the capsule may be allowed to dry and if it can then be balanced on its back with the mouth directed upward, the peristome as a whole may be examined to advantage by reflected light under the ordinary lower powers of the compound microscope.

If the peristome is in a normal condition, it will be found to be extremely sensitive to changes in moisture, responding perhaps to the ordinary breathing of the observer or at least to a gentle blowing. As in mosses in general, the teeth draw inward and close together on absorbing moisture and execute the reverse movements on drying. The equilibrium of a capsule balanced in the manner described is unstable at best, but it can be easily rendered stable and permanent by the use of various adhesives. Professor Francis E. Lloyd suggested to the writer the use of paraffin for this purpose and this has proved a convenient medium. A very small quantity of paraffin is melted on a glass slide and the capsule is placed in contact with it and held in position, mouth upward, until the paraffin hardens. Preparations made in this way may be laid aside for future use. The matured capsule, peristome, annulus, etc., may of course be subjected to further study in the usual manner, not neglecting the important fact of the presence of stomata, which may be found near the base of the capsule.

Formalin-preserved material of *Funaria* with young sporophytes is valuable, among other things, for demonstrating the structural independence of gametophyte and sporophyte. With the right kind of a pull, the young sporophyte may often be separated from the gametophyte in such a way that a microscopical examination of its foot will show that the act was accompanied by no rupture of cells. But for this special purpose *Funaria* is perhaps no better than many other mosses.

SHORTER NOTES

A NEW HAWKWEED FROM FLORIDA.—Contained in an interesting collection of plants made in the vicinity of Tallahassee, Florida, by Mr. N. K. Berg, and received from him several years ago by Dr. Small, is a single well-preserved specimen of a hawkweed which differs widely from any species known to me, and I can find no plant described which answers to its peculiar characters. In a genus of so many species, and these so very widely distributed there is chance that this plant may have been recorded

by some previous author, but this chance is not very great, for the North American species have been considerably studied, and doubtless most of the forms deserving recognition as species are fairly well understood. The plant may be characterized as follows:

Hieracium Floridanum. — Stem tall, stout, villous-hirsute below the middle, over 1 m. high, paniculately branched above the middle, the branches slender, erect-ascending; no basal leaves at flowering time: stem leaves broadly oval to elliptic or ovate-oval, firm, the lower 9 cm. long, 4–5 cm. wide, rounded at the apex, subcordate-clasping at the base, loosely villous-hirsute on both sides, entire, with numerous minute glands on the margins, the upper leaves gradually smaller, the uppermost acute: panicle 6 dm. long or more, naked, ample, its branchlets glandular; heads very numerous, 20–25-flowered; involucre 8 mm. high, its principal bracts in one series, linear, acutish, glandular, the much shorter outer ones triangular-lanceolate, acuminate or acute: achenes columnar, 4 mm. long, truncate, slightly narrowed above, a little shorter than the brown pappus.

The sessile half-clasping leaves extend down the stem to the fourth node above the mass of fibrous roots. They are very numerous and the internodes not over 2 cm. long. From the character of the achenes the species is apparently more nearly related to *H. Marianum* than to any other North American plant. —N. L. Britton.

A new Arnica from Oregon.—**Arnica aurantiaca.** Subalpine, low, forming dense patches, the simple monocephalous stems 2–6 inches high from horizontal rootstocks: leaves in about 3 pairs, the lowest broadly oblong, obtuse, the others broadly lanceolate, attenuate-acute, all entire, glabrous or nearly so, except the woolly-ciliate margin: slender peduncle sparingly woolly-hairy and minutely glandular: involucre broadly turbinate, its thin lanceolate bracts about 10, scarcely biserial, narrowly lanceolate, woolly at base, the margins obscurely glandular-ciliolate: flowers both of ray and disk orange-color: achenes silky-villous: pappus white, barbellulate.

At the head of Keystone Creek, Wallowa Mountains, Oregon, at about 7,000 feet, Aug., 1900, W. C. Cusick. A small subalpine species, uncommonly well marked by its deeply colored flowers, and silky achenes.

Arnica crocina is a name to be assigned the *A. crocea* of Pittonia, **4**: 159, in view of the fact that the Linnaean name of

what has since been transferred to *Gerbera* was *Arnica crocea.*—EDWARD L. GREENE.

A NEW PANICULARIA.—**Panicularia Holmii.** A pale perennial 25–50 cm. high, spreading by rootstocks: leaves 4–6, scabrous; the upper ligule 5–7 mm. long; blades flat, acuminate, 4–12 cm. long, 4–7 mm. wide: panicle open, lax, 5–8 cm. long, rays in pairs, the longest 4–5 cm. long, bearing about 20 spikelets on the outer half: spikelets 2–3-flowered, joint of rachilla 0.5 mm. long; first empty glume hyaline, ovate, 1 mm. long with one obscure nerve; second, hyaline, oval, 1.3 mm. long with three obscure nerves: floret scabrid, oblong, 2–2.2 mm. long, floral glume broadly oval when spread, 5-nerved, apex subtruncate, irregularly toothed; paler while attached, extending to the apex of its glume: grain elliptical, 1 mm. long, base acute, apex truncate.

Near to *Panicularia pallida;* the blades wider, spikelets mostly 2-flowered, empty glumes shorter, floret shorter, floral glumes 5-nerved instead of 7-nerved.

Growing in a creek at a beaver-dam in dense thickets of *Salix*, near Lamb's Ranch at Long's Peak, Colorado; altitude, 8,600 feet.

No. 249. Collected by Theo. Holm, July 8, 1899, for whom it is named.—W. J. BEAL.

NATURALIZED OR ADVENTIVE NARCISSI.—Mr. C. L. Gruber writes as follows from Kutztown, Pa. "I have repeatedly found two species of *Narcissus* running wild, escaped from cultivation: *Narcissus Pseudo-Narcissus* (daffodil) and *Narcissus poeticus. Pseudo-Narcissus* I have found at a number of places, usually on warm slopes of meadows, in the vicinity of gardens; and *N. poeticus* I have found in meadows, unused portions of cemeteries and on one occasion in an orchard adjoining a garden."

REVIEWS

MYCOPHAGY AND ITS LITERATURE

Some five years ago an extensive interest began to be displayed in this country toward the subject of edible fungi. It is probable that a part at least of this interest was stimulated

through the influence of William Hamilton Gibson's popular articles and illustrated work,* and the interest was increased by the publication of the special edition of the report of the State Botanist of New York for 1894 † with numerous colored plates of edible and poisonous fungi. It was thought that the fad would soon die out, but, instead, the mycological clubs seem to be growing larger and the interest in their gatherings does not appear to show any signs of abating. It was further hoped that this widespread interest in this neglected group of plants would stimulate some to take up a scientific study of the fleshy fungi, but while a very few have made slight contributions, the many desiring entertainment rather than severe study, have contented themselves to remain mere mycophagists instead of taking mycology too seriously. To appeal to this latter class of readers, four works have recently appeared. That they all appeal to eye and stomach as well as brain is evidenced by their profuse illustration, their chapters on how to cook the delectable mushroom, as well as by their assumption of scientific or pseudo-scientific diagnoses.

Of these books, two may be quickly dismissed. The modest little work of Misses Dallas and Burgin ‡ purports mainly to give the beginner in the study of the larger fungi the results of the recent field experiences of its authors. The ponderous volume by McIlvaine §, while it will doubtless prove the most useful of the entire series because of its covering a much wider range of descriptions of species than any of the others and freely quotes descriptive matter from original sources, is more or less uncertain and unreliable because one is often left in doubt where the quota-

* GIBSON. Our edible Toadstools and Mushrooms and how to distinguish them. 8vo. New York, 1895.

† PECK. Annual Report of the State Botanist for 1894. 4to. Albany, 1897.

‡ DALLAS & BURGIN. Among the Mushrooms. 7.5 × 5 × 0.875 in. Pp. xi + 175. With 11 full-page plates, two colored, the others half-tones. Weight 15 oz. Drexel Biddle, Philadelphia. 1900. Price, $1.50.

§ MCILVAINE. One thousand American Fungi. How to select and cook the Edible; how to distinguish and avoid the Poisonous. 11.25 × 8.25 × 3.5 in. Pp. xxxvii + 704. Illustrated with 193 "plates" of which 128 are simple text figures, thirty are full-page diagrams or half-tones and thirty five are colored. Weight, 122.5 oz.—about that of a Winchester repeating rifle. Bowen-Merrill Co., Indianapolis. 1900. Price, $10.00.

tions end and the less reliable remarks of the author commence. As a work intended for practical use it is a clumsy product of the bookmaker's art * as wretchedly adapted to its purposes as any botanical work that the past century produced.

The other two works however are the ones between which the mycophagic public will be more likely to choose, for at this public it is evident that their respective authors have clearly aimed. Of the two, Professor Atkinson's work † is more technical, for it is not easy for the professional botanist to lay aside the technicalities of his office in appealing to a popular audience. Yet a mixture of too technical science and recipes for cooking jars one's sensibilities of congruity, seeming to bring the kitchen in too close proximity to the laboratory. The work is admirably illustrated with photographs in half-tone and seven colored plates. The cover ill accords with the contents and the paper used is of the glossy clay-covered form so common in our time, which serves to bring out the half tones well, but ill comports with fine bookmaking and lessens the prospect of durability. The descriptions are very complete and accurate, giving details that were evidently drawn from long and close acquaintance with the specimens in their native haunts.

The work by Miss Marshall ‡ is a practical well-written text shorn, as far as possible, of technicalities, prepared to accompany reproductions of what are without question the finest series of fungus photographs that have been produced. These were made by Mr. J. A. Anderson, of Lambertville, New Jersey, and colored

* In quoting titles of books hitherto it has usually been sufficient to mention the superficial area of the cover. As these works ought to be such that they can be used afield, it is thought desirable to add the third dimension so that bulk may be computed, as well as the important consideration of weight.

† ATKINSON. Studies of American Fungi. Mushrooms, edible, poisonous, etc. 10 × 6.5 × 1 in. Pp. vi + 275. Illustrated with 223 figures, 76 of them full-page plates, seven colored. Weight, 38.5 oz. Andrus & Church, Ithaca. 1900. Price, $3.00. Reviews of this book by its own author appear in *Science*, 23 N. 1900, and in *Popular Science Monthly*, F. 1901.

‡ MARSHALL. The Mushroom Book. A popular Guide to the Identification and Study of our commoner Fungi with special Emphasis on the edible Varieties. 11 × 8 × 1.25 in. Pp. xxvi + 167. Illustrated with forty eight full-page plates, twenty four of them in colors, and numerous text illustrations. Weight, 42 oz. Doubleday, Page & Co., New York. 1901. Price, $3.00.

by his daughter, Miss H. C. Anderson. Twenty four of these have been reproduced in color, none of which equal the superb originals, though a few, like those of *Amanita muscaria*, *Pholiota adiposa*, *Boletinus pictus*, and *Phallus*, approach them. Others like *Tricholoma personatum* and *Clavaria formosa* are too highly colored and the defective reproduction of backgrounds in some cases detracts from the good illustration of the fungus itself. The work makes no claim to be coldly scientific but depends for its technical descriptions on those who have originally made them. As a piece of artistic bookmaking the Mushroom Book shows superior workmanship. Fine quality of paper, excellent printing, and plain but effective cover make the work attractive externally and internally, while its clear and simple text is not aimed above the heads of the audience to which it primarily appeals.

In both works are occasional slips of the pen and verbal inaccuracies which future editions will doubtless correct. Through both it becomes clearly evident that the camera is the scientific instrument by which we must attack the problem of bringing to the laboratory the characters of the perishable fleshy fungi.

But after all that is said, for the practical purpose for which these books are intended, namely the enlightening of unscientific people as to what are edible and what are poisonous fungi, none of the American books yet touch the standard * set by the Germans at half the price, where in place of attempts to force science on unscientific minds, in place of heavy books adapted best for library tables, we have fifty-six colored plates (nearly all of which are of species as common in America as in Europe) put up in a form adapted for the pocket and for work afield, with plain descriptions of the fungi one is sure to meet with in the field and forest, and with no entanglements of rare or new species or elaborate keys and array of technicalities; for after all the mycophagist must learn edible fungi as he learns garden vegetables—by sight—and then eat them by faith!—LUCIEN M. UNDERWOOD.

* MICHAEL. Führer für Pilzfreunde. 8.25 × 5.5 × 0.5 in. Pp. xi+31. With 56 colored plates with descriptive text opposite each for ready reference. Weight, 11 oz. Zwickau, 1897. Price, 6 marks ($1.50).

CORRESPONDENCE

"A SIMPLE DYNAMOMETER"

In the first number of TORREYA, Dr. H. M. Richards describes briefly "a very simple machine for registering approximately the amount of energy involved" in imbibition.* Passing over the terms here used (to which the physicist would take serious exception), it is obvious that the force of imbibition cannot be measured by the arrangement described. Dr. Richards has apparently confused the *force* of imbibition with the *extent* of swelling. The attraction in virtue of which water is imbibed, being probably molecular or analogous thereto, is not dependent on the number of organized structures (such as cell-walls) involved, but the extent of the swelling is. The scale in the arrangement suggested registers not force but *distance in terms of weight.* To illustrate: If the bottle contained only one layer of peas the scale might register a quarter of an ounce, since the distance through which the pan would be depressed might equal the depression which that weight would cause in the particular spring used (a weak one). If the bottle were nearly filled, however, and the peas did not jam but moved freely upward as they swelled, the scale might register half a pound. Yet the actual force of imbibition in the two cases would be exactly the same, and vastly greater than either registration. Evidently also the result would be wholly different with a very strong spring, an equal depression corresponding perhaps to 100 lbs.

The same objection would lie against the use of the scale for measuring the force exerted in growth.

It may be worth while, further, to call attention to the fact that a like error inheres in all methods of measuring the force of root-pressure in decapitated plants when a large open tube is used as a manometer.† To a less extent this objection applies also to open mercury manometers.—C. R. BARNES, *University of Chicago.*

* Richards, H. M. A simple Dynamometer. Torreya, 1: 8. Ja. 1901.

† Atkinson. Elem. Bot. 32, and Lessons in Botany, 51. Here, regarding a device recommended by Detmer merely to demonstrate the outflow of sap, it is said, "The height of this column of water is a measure of the force exerted by the roots."

"A SIMPLE DYNAMOMETER"

In reply to the above criticism by Professor Barnes the undersigned would say that it was not his intention that anyone should interpret the method described as a way to estimate the total imbibition force in all directions: but it is hardly possible, of course, to make an experiment absolutely safe against misunderstanding. The apparatus described by MacDougal * is about the only one which will adequately represent this force. In this method enough seeds are used so that the total thrust of expansion is delivered within the range of the manometer. With proper precautions however the apparatus described as "a simple dynamometer" may be made use of for a comparative study of the force of imbibition in one—the vertical direction. The precaution is a simple one, namely that the scale be not overloaded, or in other words that the amount of material used be coördinated with strength of the spring. In common with other apparatus of this type the critical point at which overloading begins can only be determined by empirical experimentation.

The same objections as those brought forward by Professor Barnes could also be made to Pfeffer's spring dynamometer† or indeed to the common lever dynamometer if the same precaution is neglected. The apparatus described by Detmer ‡ is in effect much the same, and the results obtained by it could also be rendered of small import if a two gram instead of a two hundred gram weight were used on the platform.

It should indeed have been stated that it was a "2 lb." letter scale which was used. The weaker scales might serve for indicating force exerted by the downward growth of certain roots; ones in other words which were adapted to the strength of the spring within the scale.—HERBERT M. RICHARDS, *Barnard College.*

* Journ. N. Y. Bot. Gard. 2: 39. Mr. 1901.
†Druck und Arbeitsleistung durch wachsende Pflanzen p. 18 et seq. Leipzig. 1893
‡ Practical Plant Physiology (translation), 142.

Vol. 1 No. 5

TORREYA

May, 1901

A NOTE ON THE BLADDER KELP, NEREOCYSTIS LÜTKEANA

By W. A. Cannon

One of the most interesting forms of the West Coast marine algae is the bladder kelp (*Nereocystis Lütkeana* Post. & Rupr.). This is closely related to the giant kelp (*Macrocystis*), to the sea palm (*Postelsia*), to the devil's apron (*Laminaria*), and to other forms which are familiar to all frequenters of the coast of middle California.

In these algae there is an interesting correlation between the environment and the structure and certain other peculiarities of the plants. They not only vary in the length of the daily exposure to the air, but, in addition, they occupy a varying position with regard to the impact of the waves. The bladder kelp is normally never out of the water, while the sea palm is regularly exposed to the drying influence of the atmosphere, and the other kelps vary between these extremes. The different relation of these forms to the waves, which will be spoken of later in this sketch, is presumably the basal cause of a certain and unexpected weakness of the stem of *Nereocystis*, as well as accounting for the great mechanical strength of the stem of *Postelsia.* The examination of other kelps would undoubtedly disclose quite as remarkable a connection between the plants and their individual surroundings.

The bladder kelp is light brown in color and somewhat translucent. It is said to reach a length of 300 feet and is therefore to be reckoned as one of the largest marine plants. The blad-

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der kelp grows near shore attached to the sea bottom and reaches to the surface of the water, upon which the larger part of it floats. The plant may be divided into three main regions: a holdfast, a stem, and a crown. The holdfast is made up of root-like processes which attach themselves to the rock, or to a fragment of rock, and they form a body that may reach a diameter of two feet or so. The holdfast is so securely attached to its foundation that, if it is a boulder, the rock in a storm may be dragged by the kelp from its bed to a place high on the beach.

The stem of this kelp is for the most part hollow and of variable diameter. Where the stem leaves the holdfast, it is less than an inch in diameter, and it gradually increases the diameter until, at a place just below the free end, it may be three or more inches in transverse section. The stem ends in an enlargement, beneath which it is somewhat constricted, and to the oblong enlargement the name of bladder or cyst is given. The bladder is hollow and its cavity is continuous with that of the stem. The cyst may attain a length of eight inches, although commonly it is considerably less. The wall of the stem, where it is hollow, and of the cyst is about half an inch in thickness.

The crown is composed of two groups of leaves or sporophylls attached to the free end of the bladder. They are entire and leathery, and like the rest of the plant, are smooth. The leaves vary much in length but seldom exceed three feet, and in the plants examined they are on the average one inch wide, tapering somewhat toward the end. They bear, in certain areas called sori, masses of asexual reproductive bodies. It need hardly be said that all of the measurements vary with the age of the plant. Those which I have given may probably be regarded as the maximum in the species as I have seen it. Much larger figures are given by observers farther to the northward.

The relation of the bladder kelp to the impact of the waves is such that it is subjected to stresses almost exclusively of one kind, namely, to pulls in a direction parallel to the long axis. The pounding to which some kelps, as for instance the sea palm, are subjected by the waves seems to be entirely wanting in the present case. The endeavor of the plant to keep to the surface of

the water, the level of which is perpetually changing, and the pulling action of the ebb and flow of the tide cause the free end to tug at the holdfast like a ship at anchor.

A few summers ago I wished to put up material of the "fruit" of *Nereocystis* for microscopical examination and for the purpose it was necessary to obtain fresh sporophylls. I found a place near the Hopkins Seaside Laboratory where the plants grew in abundance. They were out of reach from the shore by hand but I found that they could be reached with a long-handled gaff-hook. The attempt was made at first to pull from the water the smallest by placing the hook back of the bladder, but I was unable to get any plants in this manner. Next the hook was used as a hatchet in the hope that some of the leaves might be torn away, but they were so tough and smooth that this also failed. Finally, I tried to tear the cyst in two by striking the sharp hooks into it; much to my surprise the large bladders cracked across like the most fragile substance. I tried repeatedly blows of varying force and found that even a slight one was sufficient to break either the cyst or the stem. Through this unexpected weakness of the plant I had no difficulty in obtaining all of the sporophylls that were desired. It should be said that the plant loses this brittle character when it is exposed to the air.

In seeking for a cause of this mechanical weakness of the stem of the bladder kelp, *i. e.*, to its inability to withstand the stresses to which I subjected it, it occurred to me to compare the habitat of another form, as for instance the sea palm, with that of the bladder kelp and also the mechanical strength of the former with that of the latter. The sea palm was chosen because its habitat and habit are well marked and quite different from that of the bladder kelp. These will be considered very briefly.

The sea palm is usually about two feet high. Like the bladder kelp, it has a holdfast, a stem, and a crown of leaves or sporophylls. The stem is upright and quite independent of support from the water. The plant grows on sloping rocks between tide marks. The position of the sea palm is such that it is pounded with inconceivable force by the waves in the times of high seas, and always when the tide is in, it is subject to the

direct impact of the waves. There are several sorts of forces thus brought to bear upon the sea palm. The waves may strike the plant at right angles to the long axis, they may tend to crush the plant to the surface of the rock by their great weight, or they may exert a pulling force. And the plant has become a sort of living resultant of these forces.

To compare the two kelps with regard to the mechanical strength, I applied to the sea palm the same sort of blow that had been previously given to the bladder kelp. The result was what one would expect; it did not have the slightest effect. In addition, I found it quite impossible to wrench the kelps from their station, however hard I might try.

Briefly, it would appear then that the differences of the sea palm and the bladder kelp in habitat, more especially the difference in their exposure to the waves, go far to explain the differences which the plants themselves exhibit as regards mechanical strength, and, further, these plants appear to be able to withstand those stresses best which also occur among the conditions of their environment.

COLUMBIA UNIVERSITY.

THE NORTH AMERICAN TWINFLOWERS

BY P. A. RYDBERG

In all our manuals of botany, *Linnaea* is given as a monotypic genus, consisting of only *L. borealis* L. One variety has, however, been recognized by some botanists, viz., *L. borealis* var. *longiflora* Torr., described from the collection made on the Wilkes Expedition. This is found in the extreme eastern portion of Asia as well as on the American Pacific Coast from Alaska to California, and extends also into the Rocky Mountain region in British Columbia and Idaho. In connection with my work on the flora of the Rockies, I happened some time ago to look up the record of this plant. As a rule, it is easily distinguished from the common twinflower of the East and of the Rockies by its much longer leaves, especially on the flowering branches. In depau-

perate specimens this character is, however, not sufficient. I therefore looked for some differences in the flower.

In the original description and also in Gray's Synoptical Flora, the variety *longiflora* is said to have a longer corolla attenuate below into a distinct tube. I made a comparison with the eastern form and found that the flower of the Pacific Coast plant had a slightly longer corolla, but that our common twinflower had just as much a distinct tube as the other, but I found another character, viz., that the var. *longiflora* had about twice as long calyx-lobes. This character held in all American specimens. How in the European and west Asiatic? In them, the calyx-lobes were just between the two in length. But now I happened to make the most interesting discovery of all, viz., that all the latter specimens had a campanulate corolla without any indication of a narrow tube at the base. I then looked up illustrations of the European twinflower and found that the corolla there is figured as more campanulate, or short-funnelform without a distinct tube, while our American plant has rather a funnelform corolla with a short narrowed tube-like portion at the base, in fully developed flowers usually exceeding the short calyx-lobes. When the var. *longiflora* was described, it was evidently compared with the European species in which case the character of the corolla given above is the most prominent.

Being satisfied that our American twinflower really is distinct from the European, I tried to find if it had ever received a distinct name. I found that it had been named, in 1833, by Forbes in Hortus Woburnensis, page 135. His description is scarcely a description at all, for it does not distinguish the plant from *L. borealis*, the only character being orbicular shining leaves in contrast to oval. Undoubtedly his cultivated specimens had unusually broad leaves. There is, however, no doubt regarding the identity of Forbes's plant and our North American twinflower, which, therefore, should be known as *Linnaea Americana* Forbes.

The genus *Linnaea* contains consequently at least three species, viz:

Linnaea borealis L., of Europe and west Asia.

Linnaea Americana Forbes, of boreal America, extending south to New Jersey and Colorado.

Linnaea longiflora (Torr.) Howell (*L. borealis* var. *longiflora* Torr.), of western America and eastern Asia.

There seems to be still a fourth undescribed species, judging from rather fragmentary specimens from Kamchatka and neighboring islands. These have very small flowers and leaves, scarcely larger than those of the common cranberry.

SHORTER NOTES

A Kentucky Cornel.—Several months since, Miss Sadie F. Price sent me flowering specimens of a *Cornus*, which she had found growing on river banks near Bowling Green. Later, at my request, she furnished me with fruiting specimens from the same locality. This material is, apparently, not referable to any species thus far described, and may hereafter be known as :

Cornus Priceae.—A branching shrub 1–2.5 m. tall, with red and finely pubescent twigs. Leaves numerous ; blades elliptic to ovate-elliptic or ovate, 5–12 cm. long, rather leathery, usually acuminate, deep green and roughish-pubescent above, pale and more copiously, but rather softly pubescent and prominently veined beneath ; petioles 1–2 cm. long, pubescent like the twigs : corymbs 2–3 cm. broad during anthesis, 4–6 cm. broad at maturity : peduncles and pedicels closely and harshly pubescent : sepals triangular : corolla white, about 7 mm. broad : petals 4, oblong-lanceolate to linear-lanceolate : filaments slightly shorter than the petals : drupes about 3 mm. in diameter, subglobose, white ; stone about 2 mm. in diameter, scarcely longer than broad, faintly pitted.

On bluffs of the Barren River, near Bowling Green, Kentucky. The species flowers late in the spring and matures its fruit about the middle of the summer. The fruiting specimens I have were collected on July 27th. The specimens on which the species is founded are preserved in the herbarium of the New York Botanical Garden.

Cornus Priceae is related to *Cornus asperifolia* and *C. microcarpa*. Its leaves somewhat resemble those of the former spe-

cies, while its fruit is more like that of the latter, especially in size. The newly described species is peculiar in that it bears smaller fruit than any other North American cornel. Heretofore, *Cornus microcarpa* of the southeastern Gulf States was characteristic in bearing the smallest fruit, but the drupes of *C. Priceae* average about one third smaller and have a very differently shaped stone.—JOHN K. SMALL.

A NEW CRATAEGUS FROM WASHINGTON.—**Crataegus Piperi.** A much branched shrub 2–3 m. high. Bark of older stems light gray, that of the younger twigs brown, the lenticels conspicuous, the branches of the season and the inflorescence strigose-villous; thorns 3–5 cm. long, dark brown, shining, straight or nearly so, rather slender, somewhat reflexed: petioles 1.5–2 cm. long, bearing several glands; leaf-blades broadly oval in outline, sparingly strigose on both sides, dark and glossy above, paler and dull beneath, incised and doubly serrate at and above the middle, but merely serrate on the cuneate base; teeth sharp and gland-tipped; apex short-acuminate: corymbs 4–12-flowered; pedicels and hypanthium densely villous: sepals about 4 mm. long, prominently glandular-dentate: fruit spherical or nearly so, about 12 mm. in diameter, coral-red, sparingly pubescent even when mature.

On springy gravelly hillsides, Pullman, Washington, C. V. Piper, no. 1535 (type specimen in the herbarium of the New York Botanical Garden). Professor Piper writes that the foliage turns dull brown in autumn.—N. L. BRITTON.

CIRCAEA FRUIT DEVOID OF HOOKED BRISTLES.*—Several specimens of a smooth-fruited *Circaea* were found July 29, 1900, when a small party of us were collecting in some low woods, bordering Ten-mile creek, about three miles west of Toledo, Ohio. These plants enjoyed the same rich alluvial deposits with *C. Lutetiana*, which appeared in abundance.

Careful observation was necessary to detect the smooth-fruited form, and it seems likely that this plant is much more common

* One of the specimens mentioned by Mr. Burglehaus was exhibited to the Club at the meeting of February 12, 1901. It is interesting as necessitating a modification of the characters of *Circaea*, the fruits being entirely smooth and glabrous. Otherwise, as Mr. Burglehaus remarks, the plant is essentially identical with the North American *C. Lutetiana*; it also matches a specimen received by Dr. Torrey from Agardh, collected in Scania, Sweden, and named *C. intermedia*, but the true *C. intermedia* Ehrh., from Central Europe, is evidently different.—N. L. BRITTON.

than is supposed but is mistaken for *C. Lutetiana*, which it so closely resembles.—F. H. BURGLEHAUS.

THE MIGNONETTE AS CLASS ILLUSTRATION FOR ASCENT OF SAP. —The garden mignonette when in flower is a suitable plant with which to test the upward flow of liquid in cut stems, and by means of it, when the inflorescence is many inches long, the rate of ascent may, in some measure, be obtained without destroying the stem. This is because the petals are delicately fringed with white, and into these the liquid will pass and quickly show a beautiful color, whether blue, red, or other that may be used. The fine somewhat spatulate lobes of the corolla will first show the color in the main vein, but shortly after it will increase and become diffused throughout all the middle of the lobe, the outermost and purely cellular portion being the last to be tinged. Methyl-blue has proved the most striking color for class illustration.—BYRON D. HALSTED.

A RARE PLANT FROM WESTERN TEXAS.—Last summer, when collecting in western Texas, I found a parasite on *Dalea formosa*, which I took first, after a careless examination, for a *Cuscuta*. But in the winter, when I studied my plants from western Texas more carefully, I found that it was a very different plant and was more related to the Loranthaceae than to anything else. Lately I purchased the Plantae Novae Thurberianae and here I found my plant described by Dr. Asa Gray as *Pilostyles Thurberi* (now *Apodanthes Thurberi* B. & H.). This plant is the only representative of the Rafflesiaceae in the United States. It was first collected by Mr. Thurber on *Dalea Emoryi*, along the Gila River, in western Arizona.—HENRY EGGERT.

REVIEWS

THE GENUS LYCOPODIUM: A CRITICISM

BY FRANCIS E. LLOYD

The part of Engler and Prantl's Die natürlichen Pflanzenfamilien dealing with the Lycopodiaceae * has lately appeared, and

* E. Pritzel. Lycopodiaceae. Engler & Prantl, Die natürlichen Pflanzenfamilien 1^4: 563-606. 1900.

the treatment there given to the genus *Lycopodium* by Pritzel is open to some criticism concerning certain matters, both of fact and of opinion.

Under Section V. *Clavata*, there are given two subsections characterized as follows :

A. Leaves of one sort, shoots externally radial in structure.

B. Shoots bilateral, often flattened. Leaves in 4–8 rows, of two kinds, the lateral flat, upwardly curved, spreading, broadly emarginate, the upper and lower smaller, linear and appressed.

The species found in North America which are placed under the former are *Lycopodium annotinum*, *L. alpinum*, *L. sabinaefolium*, *L. Sitchense* and *L. clavatum*. Of these, the first and the last two are undoubtedly to be placed in this category, a statement which cannot apply to the other two, namely, *L. alpinum* and *L. sabinaefolium*. *L. sabinaefolium* has been for many years confused with *L. Sitchense*, but the two differ, among other respects, in that the former has a dorsiventral structure with leaves on the ultimate aërial branches always in four rows, while the ultimate branches of *L. Sitchense* are of radial structure with leaves in five rows.

L. alpinum, on the other hand, has a most distinct and easily recognizable bilaterality in its twigs. The leaves of this plant are indeed of three forms ; those of the upper row are "narrowly ovate, acute, those of the lateral rows thick, with one asymmetrically placed nerve, laterally truncate, acute, falcate, curved toward the under side, those of the under side trowel-shaped." *

In view of these differences, *Lycopodium sabinaefolium* and *L. alpinum* should be placed with *L. complanatum* and *L. Chamaecyparissus*, the propriety of which is practically admitted by Pritzel. Speaking of *L. Fawcettii* and *L. Wightianum* he says : "The latter plants evidently form a transition to the doubtless nearly related *L. alpinum*, to which all these species stand closely related." If we place these species in Section B of Pritzel, we should then have a series of North American forms which show as many degrees of divergence from a more primitive type.

* Lloyd, F. E., and Underwood, L. M. A Review of the Species of Lycopodium in North America. Bull. Torr. Club, 27 : 147–168. 21 Ap. 1900.

Such a type probably resembled *Lycopodium sabinaefolium*, rather than *L. alpinum*, as Pritzel suggests, for the latter on account of the trimorphism of its leaves and remarkably developed dorsiventrality forms a species of extreme divergence, while *L. sabinaefolium* has a far more generalized form. Of the radially symmetrical species, *L. Sitchense* would justly claim to lie close to the original form from which the dorsiventral plants under discussion have arisen.

The degrees of specialization seen in the North American continental species may be expressed in the following linear series: *Lycopodium sabinaefolium*, *L. Chamaecyparissus*, *L. complanatum* and *L. alpinum*.

Referring to the diagnosis of Section B, it may further be pointed out that the leaves of the upper and lower rows are not always appressed. The upper ones in *L. alpinum* and the lower ones in *L. Chamaecyparissus* are indeed so. In *L. complanatum* and *L. sabinaefolium* the leaves of both upper and under rows are spreading.

Under Section B, Pritzel places *Lycopodium complanatum* and *L. Fawcettii* with *L. Chamaecyparissus* as a variety of *L. complanatum*. The relation of these two last named plants has been heretofore a matter of doubt, but the facts which have already been set forth * would seem fairly to settle the question so far as North America is concerned.† Here the two plants may be found growing in exactly the same habitat, but still differing anatomically, in external features and in physiological characters. The more obvious characters of the species *L. complanatum* are seen in the ultimate shoots which are distinctly plagiotropous, much flattened dorsiventrally, with leaves of the under row much reduced, spreading, and not emarginate. The rhizome is above ground. The spores ripen at least as much as four weeks later than those of *L. Chamaecyparissus*, which has

* Lloyd, F. E. Two hitherto confused species of Lycopodium. Bull. Torr. Club, **26**: 559–567. 15 N. 1899.

† While at Kew during the past summer I saw the type of *Lycopodium tristachyum* Pursh, Fl. Am. Sept. **2**: 653. 1814, and find that it is exactly the species separated by Al. Braun many years later as *L. Chamaecyparissus*. The earlier name will therefore replace the later and another of Pursh's species can be justified.—L. M. UNDERWOOD.

orthotropous annually innovating branchlets, a much less pronounced dorsiventrality, evidently emarginate, appressed under leaves and an underground rhizome. No intermediate conditions were found to reward a diligent and repeated search on the part of two observers over an acre of ground where both plants were growing side by side in great abundance. One is therefore irresistibly driven to the conclusion, no matter what view may be taken of the question of species, that here at least are distinct plants which must be completely separated in order satisfactorily to recognize their differences.

Finally, the authorities for *Lycopodium Fawcettii* and *L. porophilum* are quoted incorrectly. It would appear that there is but one alternative in such matters, either to leave the authority out altogether or to give it correctly.

NEWS ITEMS

William Austin Cannon, A.M. (Stanford University), has been reappointed Fellow in Botany in Columbia University. Mr. Cannon is making a special study of certain features of hybridization in plants.

Mr. Jared G. Smith, of the U. S. Department of Agriculture, has gone to Honolulu to assume the directorship of the Hawaiian Agricultural Experiment Station.

Mr. Roland M. Harper, graduate student in the Botanical Department of Columbia University, is temporarily in Washington, D. C., as special assistant in the United States National Herbarium.

Professor William F. Ganong's paper, entitled "Suggestions for an Attempt to secure a standard College Entrance Option in Botany," read before the Society for Plant Morphology and Physiology at the Baltimore meeting, December 28, 1900, is published in *Science* for April 19, 1901.

A suggestive contribution to the literature bearing upon questions of nomenclature is "The Determination of the Type in composite Genera of Animals and Plants," by President David Starr Jordan, printed in *Science* for March 29, 1901.

The annual meeting and exhibition of the Horticultural Society of New York was held at the Museum of the New York Botanical Garden, May 8 and 9. Prizes to the amount of $700 were offered, $500 by the Botanical Garden and $200 by the Horticultural Society.

Mr. George V. Nash has returned from the Royal Gardens at Kew with about 1,300 species of living plants for the New York Botanical Garden. Through the courtesy of Sir W. T. Thiselton-Dyer, the Director of the Royal Gardens, further consignments are expected in the near future.

The report of Prof. Charles H. Peck, State Botanist of New York, for the year 1899, has recently been distributed. In addition to the other matter, it contains as usual an important contribution to the knowledge of our fleshy fungi. Vol. 3, No. 4, of the Memoirs of the New York State Museum, a quarto volume containing descriptions and illustrations of the edible and unwholesome fungi of New York—the second volume of the series—was issued at about the same time.

Thomas Conrad Porter, D.D., LL.D., Emeritus Professor of Botany in Lafayette College, died suddenly at Easton, Pa., on April 27th, in the 80th year of his age. He was well known as a botanist, especially by his contributions to our knowledge of the flora of Colorado and of Pennsylvania. He won distinction in the literary field also, being the first to call attention to the resemblance between "Hiawatha" and the Finnish epic *Kalevala*, and writing several well-known translations of German poems.

The Departmental Committee on Botanical Work and Collections at the British Museum and at Kew has recently reported to the Lords Commissioners of His Majesty's Treasury, in part as follows: "That the whole of the botanic collections at the British Museum now administered by the Keeper of the Department of Botany under the Trustees, with the exception of the collections exhibited to the public, be transferred to the Royal Botanic Gardens, Kew, and placed in the charge of the First Commissioner of His Majesty's Works and Public Buildings under conditions indicated below, adequate accommodations being there provided for them."

Vol. 1 No. 6

TORREYA

June, 1901

"WHEN IN ROME DO AS THE ROMANS DO"

By P. A. Rydberg

Professor E. L. Greene has lately published a very interesting article in the *Catholic University Bulletin* under the title, "Some Literary Aspects of American Botany" in which he criticizes especially the forms of titles used by botanical authors in America. I intend here to point out some misuses in naming plants. If, in attempting to do this, I should myself make some blunders, I trust they may be pardoned and corrected by some more competent critic.*

The old proverb, "When in Rome do as the Romans do," may well be applied to the use of Latin in botanical descriptions and terms. In other words, when we use the Latin language in science we should always try to use it as a Roman would have done. Latin descriptions such as two which were published in one of our leading botanical journals a few years ago † bring discredit to the author as well as to the journal that prints them.

This time I shall, however, dwell only upon specific names given in the honor of some person. Two methods have been used by biologists, viz., the Latin genitive form of the proper noun and an adjective formed from the same by appending *-anus, -ana, -anum*. Many botanists have agreed to use the former when the person in whose honor the plant is to be named has discovered it, described it or done any other work in connection

* Even the best may make mistakes sometimes, as was illustrated in the article cited above, where Professor Greene misquoted a title he criticized. On page 153 appears "Contributions to the Comparative Histology of Pulvini and the Resulting Pholeolitic Movements," and on page 157, "Pholiotic Movements" instead of "* * * Photeolic Movements" as it reads in the original.

† Bot. Gaz. 26: 268, 269. 1898.

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with it, and the latter when the author wishes to honor some friend without the latter being otherwise connected with the plant. The acceptance of this distinction is far from universal, however.

If a friend happens to discover an undescribed species and one wishes to name it after him, it is important to know how to give his name in a proper Latin form. The Berlin botanists have adopted the following rules: If the name ends in a consonant other than *r*, add *-ii* to the name, but if the name ends in a vowel or *r*, add *-i*.* We therefore say *Carex Bicknellii*, but *C. Torreyi* and *C. Fraseri*. The only exception to these rules admitted by the Berlin botanists is in case the name ends in *a*, when it follows the first declension with *-ae* in the genitive, as for instance *Physalis Lagascae*, named after the Spanish botanist Lagasca.

The adding of *-ii* or *-i* to the proper name of any barbarian language has not come down to us from the classic Latin; for the old Romans latinized names in many different ways, and if they could not give it a good Latin form, they adopted it as it was and made it indeclinable. The custom mentioned comes to us from the middle ages, when Latin was the language of the learned and every learned man must have a Latin name. Most of them formed this by adding *-ius* or *-us* to the name, so that Des Cartes became *Cartesius*, Rudbeck, *Rudbeckius*, and Ray, *Raius*; others, however, translated their names, as for instance Bock, who called himself *Tragus*.

The adding of *-ius* and *-us* in the nominative and *-ii* and *-i* in the genitive is good, as a rule, whenever the name is not already in good Latin form. It would never occur to a Roman to write *Lagascai* as the genitive of Lagasca, and the Berlin botanists have seen it in that light, but would it not be as ludicrous in the eyes of a Roman to see the genitive of Magnus written *Magnusii?* And still the Berlinese cite this as the proper form. Names such as Retzius, Hieronymus, Wislizenus, etc., have a good Latin nominative form (*Hieronymus* was used in old Latin), and no ending needs to be added. It would be worse than grammar school Latin to write in the genitive *Retziusii*, *Hieronymusii* and *Wislizenusii*. American botanists have, in general, refrained from such forms. The only name that in America has been treated

* If the friend were a lady, *-iae* and *-ae* should then be substituted, respectively.

somewhat in the Berlin fashion, is that of a German, Mr. Purpus, in whose honor *Eriogonum Purpusi*, etc., have been named; but the Americans have satisfied themselves with only one *-i* at the end.

The use of *-i* instead of *-ii* even after a consonant has been very common in this country. Watson, for instance, almost always used one *-i*. Plants named after Dr. Chapman are nearly always *Chapmani* (one *-i*) and there are perhaps ten species named *Engelmanni* (one *-i*) to one called *Engelmannii* (two *-i*'s). In the mediaeval Latin names ending in *-mann* were written with the ending *-mannus*, without an *i*. The genitive therefore had only one *-i*. Whether we should keep up this tradition or not is a matter of taste. We have no precedent in classical Latin to follow. There are cases, however, where a consonant should be followed by only one *-i* as in *Bernhardi*, *Gerardi*, etc., as Bernhard and Gerard have old Latin forms in *-us*, *Bernhardus*, *Gerardus*. In the same way, I think, we should write *Richardi*, *Howardi*, *Havardi*, *Bongardi*, etc., all with one *-i*.

Names ending in *r* take according to the Berlin rule one *-i*. This is not because *r* is a semivowel and the nominative therefore should end in *-us* instead of *-ius*, but simply because those ending in *-er* have as they stand a Latin nominative ending, and the Berlinese let the few ending in *-ar*, *-ir*, *-or*, *-ur* follow the same rule. An old Roman would never have done this. The latter names should follow the third declension, like the Latin words, *nectar*, *victor*, *robur*, *vultur*, etc. Fendler, Berlandier, Fraser, Heller, Carpenter, Porter, etc., being in good Latin form as they stand, follow the second declension regularly, with *Fendleri*, *Berlandieri*, etc., in the genitive; but Bolivar, Victor, Arthur and Muir should have the genitives *Bolivaris*, *Victoris*, *Arthuris* and *Muiris*, unless the last may be regarded as an exception and follow the declension of *vir* (*-i*).

According to the Berlin rules, names ending in a vowel (except *a*) should take one *-i*. Those ending in *-a*, follow the first declension. Why should not those ending in *-o* follow the third? All foreign words ending in *-o*, taken into Latin, followed the third declension; and this was not only the case with Greek words, but also those from the Phoenician, the Egyptian and

other barbaric tongues. Why should we not follow the same custom in botanical names? Ledebour wrote *Claytonia Chamissoi;* but Eschscholtz had before him in manuscript, *C. Chamissonis.* Many of the later botanists have used the proper form. We have, therefore, *Aquilegia Ottonis*, *Cyperus Ottonis*, *Lupinus Chamissonis*, *Viburnum Demetrionis*, *Sullivantia Ohionis*. These forms are much more common and of course far better than such as *Astragalus Serenoi*.

But if names ending in *-o* should follow the third declension, then should also those ending in *-on*. Here, however, botanists have seldom tried to follow Latin customs. We find both *Brittoni*, *Eatoni*, etc., and *Brittonii*, *Eatonii;* but not *Brittonis*, *Eatonis*, etc., which would be better. Besides myself, who have used *Wootonis* and *Congdonis* as specific names, I think no American botanist has used a genitive in *-onis*, in naming a plant in honor of a person whose name ends in *-on*. I know of one case in which such a genitive was used, but the plant was not named after a person. I refer to *Astragalus Zionis* Jones.

A German may claim that Anton has the Latin form *Antonius*, which follows the second declension with *-ii* in the genitive; but we must remember that Anton is a German and Scandinavian form and that the name is written in French Antoine and in English Anthony, while most of the names ending in *-on* are French or English, and in the latter case derived from the Norman-French or formed under its influence. The majority of modern French words ending in *-on* came from Latin words ending in *-o* or *-on*, both with *-onis* in the genitive. I think, therefore, that all names ending in *-on*, at least those belonging to any of the Romance languages or derived from them, should follow the third declension.

The extension of this rule to names ending in *-son*, as Anderson, Nelson, etc., is perhaps of doubtful propriety. These are all of Scandinavian origin and have a peculiar history. In Sweden they have never, until in later years, been regarded or treated as family names. Peterson meant Peter's son and nothing more. If Peter Anderson had a son by the name of John, he would be known not as John Anderson, but as John Peterson; and John's son Nels would be Nels Johnson. From the middle ages to the

later part of the eighteenth century, these names were often written in Latin. The first Protestant Archbishop of Sweden was Lars Peterson, who usually wrote his name *Laurentius Petri* (the word *filius* being understood). In Swedish history we read both of *Olaus Magnus* (Big Olof, so called for his size) and *Olaus Magni* (Olof Magnuson). In the genitive both names would be *Olai Magni*. The old way of writing Johnson, Anderson, Larson, etc., could scarcely be used in botanical names, as it would cause much confusion, and the names would scarcely be recognizable. The three above mentioned would be respectively, *Johannis*, *Andreae*, and *Laurentii*. If a Roman had seen Anderson written, without knowing the meaning or derivation, he would very likely have written the genitive as *Andersonis*. He might perhaps have given it the Latin form *Andersonius* (*-ii*); but never as many of our botanists do, *Andersonus* (*-i*).

If a Roman had seen the name Ames, he would probably have written it in the genitive *Amis*, according to the third declension. It is perhaps safer to latinize such names and write *Amesius* (*-ii*), in the same way as Des Cartes became *Cartesius* (*-ii*).

From the foregoing it would appear that the Berlin rules must be modified in order to accord with good Latin usage, and that the latinizing of proper nouns is a matter that needs the attention of a botanical congress.

HETEROPHYLLY IN HEPATICA ACUTA

By S. H. Burnham

A few years ago, while collecting in an old rich wood near Vaughns, Washington County, New York, I found several plants of an interesting acute-leaved Hepatica, and transplanted a single plant in my wild garden, where the leaves have remained constantly seven- to nine-lobed. The normal form has leaves with three acute lobes, sometimes passing into *Hepatica Hepatica* (L.) Karst., with which it sometimes grows, though it usually blooms a week earlier in northern New York. Often, leaves are five-lobed; but rarely is the lobing carried so far as in the above plants.

In the Bulletin of the Torrey Botanical Club, **8**: 36. 1881, is a note with illustration of a leaf of the round-lobed Hepatica with seven lobes, which was exhibited by Mr. Gerard at a meeting of the Club. He says all the leaves of the plant possessed the same peculiarity, "the middle lobe being deeply trilobate and the lateral ones bilobate, thus making an approach toward the leaf forms found in the genus *Anemone.*"

Professor W. R. Dudley, in his Cayuga Flora, alludes to "forms with five- and even seven-lobed leaves in rich shaded soil at Big

Gully, etc." In the Columbia Herbarium is a specimen from Lookout Mountain, Tenn., with eight-lobed leaves, collected by Dr. A. W. Chapman. There is also a specimen from northern New Jersey, at State Line, collected by Dr. N. L. Britton, June 6, 1885, with five- to seven-lobed leaves.

Thanks are due to Miss Alexandrina Taylor for the care with which she has drawn one of the beautiful leaves of the Washington County plant.

AN ALLEGHANIAN RUDBECKIA

By John K. Small

While on excursions into various portions of the southern Alleghanies and the Blue Ridge, I have quite frequently met with a very characteristic *Rudbeckia*. It occurs more frequently at altitudes between 1000 and 1600 meters, although sometimes it may be found at elevations a little lower or considerably higher than those just indicated. As far as its biological distribution is concerned, it is mainly confined to the Alleghanian life-zone and thrives best in such localities as are inhabited by *Solidago monticola, Gaylussacia ursina* and *Vaccinium pallidum*. So far as I can learn, this species has never been described, but may now be characterized as follows:

Rudbeckia monticola

Perennial by short horizontal or oblique rootstocks. Foliage hirsute or hirsute-hispid: stems 3–11 dm. tall, sometimes tufted, normally simple, occasionally branched above: leaves few; blades oblong, elliptical, oval or ovate, 5–10 cm. long, sharply serrate, sometimes shallowly so, those of the basal and lower stem-leaves with winged petioles or petiole-like bases, those of the upper stem-leaves sessile and usually partly clasping by their broad bases: bracts of the involucre linear to linear-lanceolate, 1–1.5 cm. long, bristly hirsute, reflexed: ray-flowers several; ligules bright yellow, 2–3.5 cm. long: disk hemispheric to ovoid, 12–18 mm. broad, dark purple-brown to almost black at maturity: bractlets acute, ciliate near the slightly broadened tips: disk-corollas 3–3.5 mm. long: achenes 2.5 mm. long, slightly enlarged upward, finely longitudinally ribbed and very minutely pitted.

In woods, West Virginia to North Carolina, Georgia, Tennessee and Alabama. Summer.

Rudbeckia monticola is related to *R. hirta* from which it may easily be separated at sight by the sharply serrate blades of the upper stem-leaves with their broad partly clasping bases. The type is preserved in the herbarium of the New York Botanical Garden. The following cited specimens belong here:

West Virginia: White Sulphur Springs, July 16, 1892, *A. Brown.*

North Carolina: Haywood Co., July, 1885, *M. E. Hyams;* Swain Co., July 12, 1891, *Beardslee & Kofoid;* Biltmore, June 10, 1896, Biltmore Herbarium no. 852; Hendersonville, June 29, 1898, Biltmore Herbarium no. 852a.

Tennessee: White Cliff Springs, July 11, 1894, *T. H. Kearney, Jr.;* Lookout Mountain, June 28, 1897, *H. Eggert;* Wolf Creek, August, 1896, *A. Ruth*, no. 4055.

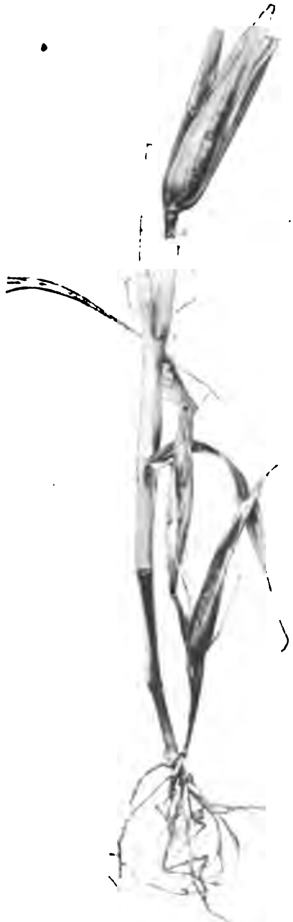
GEORGIA: Tallulah Falls, August 8, 1893, *J. K. Small;* Thomas Bald, August 9, 1893, *J. K. Small;* Estotoah Falls, August 11–12, 1893, *J. K. Small* (type); Stone Mountain, July 27, 1893, *J. K. Small.*

ALABAMA: Auburn, June 5, 1897, *Earle & Baker*, no. 276.

DIEMBRYONY IN CORN

BY BYRON D. HALSTED

In making some germination tests of corn upon a large scale a single grain was met with that showed a double embryo—one apparently normal and the other secondary. The grain in germination was lying with the embryo side downward so that the main plantlet needed to turn upward around one side of the grain making a J-shaped curve. The smaller shoot grew nearly parallel with the first one and stood close to it, although much smaller. The grain was transferred from the germinating dish to earth in a flower pot and supplied with conditions for further growth, at which time each plantlet had a main root.



After growing as long as the smaller plant would, the two were removed and a photograph taken from which the little side engraving has been made.

It is seen that one plant grew quite normally, while the other remained small and attempted to produce two ears, but without tassel, and no grains were obtained.

It only needs to be said that the case in hand was a yellow grain from an ear picked upon the College Farm and brought to me, because it was the only one of a large field that had dark, nearly cherry-colored grains mixed in almost equal numbers with

the yellow grains. It is regretted that a sketch of the two embryos was not made before the grain was placed in the earth for further growth. Out of very many thousands of germinating grains of corn, this is the only one showing diembryony that has come to my notice.

RUTGERS COLLEGE, May 4, 1901.

REVIEWS

A work that is sure to play an important part in popularizing botanical studies on the Pacific Coast is the recently published "Flora of Western Middle California" * by Dr. Willis Linn Jepson, Assistant Professor of Botany in the University of California. This is a carefully written and attractively printed descriptive manual, with keys to the families, genera, and species. In many species a considerable range of variability is recognized, especially in vegetative characters, under conditions which are definitely named. New species and varieties are described in various genera. In the matter of nomenclature, it is not wholly obvious just what considerations have determined the choice of generic names. The nomenclature is evidently not that of Berlin, Kew, Harvard, the Rochester Code, or of the Flora Franciscana. With considerable allowance for the inherent difficulties of making one's practice seem always consistent and logical to another, it may be said that Professor Jepson's selection of names has the appearance of being an arbitrary compromise between the so-called "conservative" and "reform" tendencies. The influence of the American principle of "Once a synonym, always a synonym" is doubtless to be recognized in the substitution of *Tumion* Raf. for *Torreya* Arn., *Osmaronia* Greene for *Nuttallia* T. & G., and *Xylothermia* Greene for *Pickeringia* Nutt. To the "priority of place" idea is evidently to be attributed the acceptance of *Tissa* Adans. in the place of *Buda* Adans., while simple priority of publication is apparently responsible for the adoption of *Panicularia* Fabric. for *Glyceria* R. Br., *Razoumofskya* Hoffm. for *Arceuthobium* Bieb., *Koellia* Moench for *Pycnanthemum*

* Jepson, W. L. A Flora of Western Middle California. 8vo. Pp. iv + 625. 16 Ap. 1901. Encina Publishing Co., Berkeley. Price $2.50.

Michx., *Bolelia* Raf. for *Downingia* Torr., *Ptiloria* Raf. for *Stephanomeria* Nutt., etc. In these changes from the usage of the "Botany of California," there is no suggestion of the fifty-year limit proposed by the Berlin botanists and there is little evidence of mercy toward names which, according to some writers, have become so consecrated by long usage as to be out of the reach of modern nomenclatural legislation. Yet several generic names equally vulnerable, like *Capsella* Medic., *Echinocystis* T. & G., and *Dicentra* Bernh., are retained. But these possibly await modification in the second edition, which the manifest merits and popular qualities of the work will doubtless soon make a necessity. [M. A. H.]

CORRESPONDENCE

"A Simple Dynamometer"

The discussion of this particular apparatus would not deserve more space, did not the criticism involve a principle applicable to a number of instruments for measuring the force exerted by plants. In his reply * to my former letter, Dr. Richards implies that I misunderstood his experiment; rather, I think, he has missed the point of my objection. I had no thought of criticizing his device because it does not measure the force of imbibition in all directions. The difficulty is that the proposed dynamometer does not register correctly *any* component of the force of swelling, for the simple reason that the spring scale is not adapted to do it. Gravitation can act through an indefinite distance and the weight in the pan descends until the distortion of the spring is as great as the force acting can produce. In swelling, on the contrary, the force to be measured acts through a very limited distance only, and when the limit of its thrust is reached the index stops, whether it indicates an ounce or a ton. The principle is that distortion of a system, however registered, can never be used to measure correctly any force, unless the possible distortion is greater than that necessary to produce the maximum registration of the instrument.

The caution regarding overloading, therefore, is not pertinent,

* Torreya, 1: 48. Ap. 1901.

because, owing to the limited displacement by the swelling, the spring could not easily be loaded beyond its capacity to register, although any component of the force acting is really vastly in excess of its powers to register in units of weight.

The objections made above do indeed apply to any apparatus not used in accordance with the principle enunciated. But Detmer is careful to say that his device* is only for the purpose of showing that external work is done by swelling seeds.

C. R. BARNES.

Notwithstanding the careful explanation given above by Professor Barnes the writer is still of the opinion that overloading from the standpoint of the *strength* of the spring is, as previously stated, entirely possible, and it seems too that this is the critical point.—H. M. RICHARDS.

NEWS ITEMS

Volume 7 of the Contributions from the Department of Botany of Columbia University has recently been completed by the publication of the 175th number of the series.

Dr. H. M. Richards, Dr. P. A. Rydberg and Miss Louise B. Dunn are spending their summer vacations in Europe.

Dr. D. T. MacDougal left New York on June 2d to conduct some special botanical investigations in western Montana.

Tracy Elliot Hazen, Ph.D. (Columbia University, 1900), has been appointed Director of the Fairbanks Museum at St. Johnsbury, Vermont, and enters upon the duties of the position this month.

Mr. Frederick H. Blodgett, recently a graduate student in Columbia University, is now an assistant in the botanical department of the Field Columbian Museum, Chicago.

Edward W. Berry, of Passaic, N. J., a member of the Torrey Botanical Club, has been awarded the Walker Prize of fifty dollars by the Boston Society of Natural History for an essay on *Liriodendron*.

* Pflanzen-Phys. Prakt. 119.

Professor L. M. Underwood of Columbia University, and Mr. O. F. Cook and party, of the U. S. Department of Agriculture, sailed for Porto Rico on June 8th for the purpose of studying the flora of that island.

The death of M. Henri Philibert, the European specialist in the genus *Bryum*, occurred on the 14th of May at Aix in France in his 79th year. He had just added a tenth article to his series of studies on the peristome, which have appeared in the *Revue Bryologique.*

The tablet in memory of Asa Gray in the Hall of Fame of the New York University was unveiled on May 30 by Professors B. D. Halsted, B. L. Robinson and L. M. Underwood, representing the Botanical Society of America.

The third session of the Rhode Island Summer School for Nature Study will be held at the Rhode Island College of Agriculture and Mechanic Arts, Kingston, R. I., from July 5 to July 20. The botanical instruction is in charge of W. W. Bailey, H. L. Merrow, F. W. Card, A. B. Seymour and G. E. Adams.

"The Sea-Beach at Ebb-Tide" is the title of a recent book written by Augusta Foote Arnold and published by the Century Company. It contains non-technical descriptions and numerous illustrations of the larger and more common marine plants of the United States, together with a similar account of the littoral animals.

The entire palaeobotanical collection of Columbia University, and the books on palaeobotany from the University Library, except such minor part thereof as is needed at the University for undergraduate instruction, will be deposited with the New York Botanical Garden during the coming summer, under the terms of a supplementary agreement recently made between the two institutions. The museum of palaeobotany will be installed in one of the well-lighted basement halls of the Museum Building of the Garden.

Vol. 1 No. 7

TORREYA

July, 1901

JUNCOIDES IN THE SOUTHEASTERN STATES

By John K. Small

While collecting about the summit of Table Rock in western North Carolina, in company with Mr. Heller, specimens of a species of *Juncoides* in every way smaller than the so-called *Juncoides campestre* were gathered and found to be bulblet-bearing at the base. Further investigation showed that the same form had previously been collected on Lookout Mountain, Tennessee, by Prof. A. Wood and had by him been described under varietal rank, he evidently not thinking it worthy of being considered a species. Later experience with the genus in the Southeast has led me to the conclusions expressed in the following brief synopsis.

Juncoides Adans.

Differs from *Juncus* by its closed leaf-sheaths, the 1-celled ovary with basal placentae which support 3 ovules and later 3 seeds.

Key to the Species.

Peduncles terminated by 1 or rarely 2 flowers: capsule of an ovoid type. 1. *J. pilosum*.
Peduncles terminated by compact spikes: capsule of an obovoid type.
Sepals and petals 3–4 mm. long: capsules much surpassed by the perianth. 2. *J. echinatum*.
Sepals and petals 2–2.5 mm. long: capsules surpassing the perianth or about equalling it. 3. *J. bulbosum*.

1. Juncoides pilosum (L.) Kuntze. Stems 1–3 dm. tall, 2–4-leaved. Leaf-blades 3–8 mm. wide, webby, blunt and almost gland-like at the apex: peduncles filiform, equal or nearly so: perianth 2.5–3 mm. long; sepals and petals triangular-ovate, brown except the hyaline margins: capsule usually about 1/4 longer than the perianth, sometimes but slightly longer.

[The exact date of publication of each issue of Torreya is given in the succeeding number. Vol. 1, No. 6, comprising pages 61–72, was issued June 20, 1901.]

In woods, New Brunswick to Alaska, Georgia, Tennessee, Michigan and Oregon. Also in Europe and Asia.

Luzula Carolinae S. Wats., founded on a specimen from Grandfather Mountain, North Carolina, is *Juncoides pilosum*. The elongated bract described by Dr. Watson is the upper leaf of the stem and not the bract subtending the inflorescence.

2. **Juncoides echinatum** n. sp. Base of plant not bulblet-bearing. Foliage webby-pubescent: stems 2.5–5 dm. tall: peduncles conspicuously unequal, each terminated by an oblong or cylindric spike: sepals and petals lanceolate, 3–4 mm. long, acuminate, greenish or pale brown, soft and hyaline at the tip: capsule obovoid, 2.5–3 mm. long, manifestly longer than thick.

In woodlands, North Carolina to Georgia and Alabama.

This species is the representative of *Juncoides campestre* in the Southern States. The following specimens belong here:

ALABAMA: Auburn, April 17, 1897, *Earl & Baker*. (Type, in the herbarium of the New York Botanical Garden.)

NORTH CAROLINA: Biltmore, May 14, 1897, Biltmore Herb. no. 565.

3. **Juncoides bulbosum** (Wood). Base of plant accompanied by bulblets. Foliage almost glabrous or somewhat webby on the leaf-margins and at the top of the sheaths: stems 1–4 dm. tall: spikes shorter than those of *J. echinatum*: sepals and petals ovate-lanceolate or lanceolate, 2–2.5 mm. long, brownish, acuminate, neither manifestly soft nor hyaline at the apex: capsule broadly obovoid or globose-obovoid, surpassing the sepals or sometimes about equalling them. [*Luzula campestris* var. *bulbosa* Wood, Cl. Book, 753. 1863.]

In woods, thickets and open sandy places, Virginia to Georgia, Kansas and Texas.

This species is apparently quite common within the range given above, but very few specimens were collected until within the last four or five years. The following belong here:

VIRGINIA: Summit of White Top Mountain, June 26, 1892, *N. L. & E. G. Britton* and *A. M. Vail*.

NORTH CAROLINA: Summit of Table Rock, July 2, 1891, *J. K. Small* and *A. A. Heller*.

TENNESSEE: Lookout Mountain, *A. Wood*; Jackson, March, 1892, *S. M. Bain*, no. 172, at least in part; Franklin County,

June 8, 1897, *H. Eggert;* Knoxville, April, 1897, *A. Ruth*, no. 1101.

MISSISSIPPI: Topelo, April 6, 1889, *S. M. Tracy.*

TEXAS: Houston, April 10, 1872, *E. Hall*, no. 655; Houston, April 17, 1900, *B. F. Bush*, no. 32; Uvalde, March 20, 1891, *E. N. Plank.*

ARKANSAS: Prescott, April 9, 1900, *B. F. Bush*, no. 552 Benton County, *E. N. Plank*, no. 45.

KANSAS: Cherokee County, 1896, *A. S. Hitchcock*, no. 844.

AMSONIA AMSONIA IN NEW JERSEY

By B. S. Miller

May 23d a friend sent me a small specimen to identify, as it had created quite a discussion at a card party. It was seen from the roadside and picked to match a gown. Vanity, after all, is of some use in this world, as it has been the means of establishing this dainty little blue flower in New Jersey. Professor Britton verified it for me, as I saw it was not found so far north and in such a dry locality. There were fourteen clumps of this plant growing in a high, dry, rolling field, rocky and of sandy soil. It is a ten-acre lot cleared for building purposes, woods of oaks, chestnuts and hickories growing about three sides of it. The plants show evidence of being there some time, for when the grass is mown it has been cut down and old stalks are still on the roots—four or five on some. There were such plants as these growing in this same lot, which will give an idea of the poor soil. Three large patches of *Lupinus perennis*, and in the midst of one, I found six clumps of *Amsonia;* as the blue being a much more delicate shade, one could distinguish it from a distance. *Fragaria Virginiana*, *Trifolium pratense*, *Rubus Canadensis*, very abundant, *Potentilla argentea*, *Antennaria plantaginifolia.*, *Chrysanthemum Leucanthemum* and small patches of *Pteridium*

aquilinum. On speaking of it to a naturalist, Mr. Hales, he said it was originally brought to Ridgewood from the South by a Mr. Fuller, who had an experimental garden. It would not grow on his ground, so he gave some to Mr. Hales, who has a reclaimed meadow for a garden, and there the plant was much more beautiful—a large clump, twenty-five years old, fully four feet around and about that high, while what I found was only about a foot to a foot and a half high and not so thrifty. This same Mr. Fuller gave some to the people who own this lot and it has grown in their garden. Now this lot is about a quarter of a mile from this garden where the original plant was, so it has spread by means of the wind or birds. The odd fact to me is, that though it grows in "damp soil" it has not spread from Mr. Hale's garden, but from the latter place which is very high and dry, this part of Ridgewood being one of the highest parts of Bergen County.

LYCOPODIUM TRISTACHYUM

By E. J. Hill

When Prof. Lloyd's article "Two hitherto confused Species of Lycopodium" (Bull. Torr. Club, **27**: 559. 1899) appeared, my specimens, labeled *L. complanatum* L., were examined with a view to test them by the characters mentioned and several of them were found to agree with the description of *L. tristachyum* Pursh (*L. Chamaecyparissus* A. Braun). Some had already been designated by this name as varietal, and their peculiarities noticed. One of these was the burial of the rhizome from three to nine centimeters below the surface of the ground, considerable digging often being required to uncover them. They have all been found in sandy soil, in woods of pine or mixed pine and oak. The rhizomes and the basal parts of the aërial shoots are pale, being blanched by exclusion of the light. The ultimate branches are numerous and crowded, commonly narrower and much less

limited to one plane than those of *L. complanatum*. The branches by their abundance make a very heavy top. Mounted specimens generally have a heaped appearance, the branches lying upon each other in several layers, while specimens of *L. complanatum* are nearly or quite flat. The time of collecting has been August and October. The bracteal leaves and sporangia have been found to be yellow as early as August 2d, and the spores beginning to be shed. In October the sporangia had all become empty. One obtained at Ha! Ha! Bay, Quebec, Can., August 25th, was less mature, the sporangia closed and the bracteal leaves but slightly yellowed. Others collected at the same time were shedding their spores. Climatic reasons will probably account for the later ripening. In the same region the Early Blueberry (*Vaccinium Pennsylvanicum*) and the Canada Blueberry (*V. Canadense*) were found to be contemporary in the ripening of their fruit. They grew intermingled, the fruit of both equally abundant on the bushes. In the latitude of Chicago the former begins to ripen the last of June; the latter, occurring a little farther north, ripens in August.

The following are the stations and times of collecting the specimens of *L. tristachyum* Pursh, in my possession: Fruitport, Mich., August 2, 1872; Indian River, Mich., August 3, 1878; Miller, Ind., October 2, 1881; Ha! Ha! Bay, Quebec, August 25, 1888. The three former localities are contiguous to Lake Michigan, Miller being in the dune region at the head of the lake, Indian River in a dune locality near its northern end, and Fruitport midway on the eastern shore. From all I recall about the Lycopodiums I had identified as *L. complanatum*, but did not take specimens for preservation, I feel quite safe in stating from the impression its habit has left in memory that *L. tristachyum* is the more common in places where I have met with the two species in the upper lake region. Those growing at Miller, Ind., do not seem to fruit very freely, the shoots being commonly found barren.

CHICAGO, ILL.

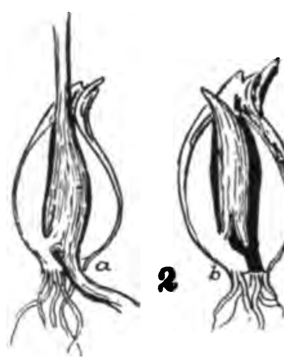
A TULIP WITH A RUNNER

By Frederick H. Blodgett

A number of young tulip bulbs were planted in November, in a shallow box for indoor cultivation. On January 23, 1901, one of these plants was removed from the soil for examination. The leaf was several inches long, but still tightly rolled, as the plants were kept in a dark room.* From the bottom of the bulb a runner extended obliquely downward for two inches or more. The tip was broken in lifting the plant from the soil, so that it could not be examined. The appearance of the bulb is shown, natural size, at Fig. 1.

Fig. 1.

Fig. 2.



The bulb was cut open in the plane of the runner. In origin the runner was found to be quite similar to those of *Erythronium*. The base of the runner and that of the leaf stalk are continuous, and form a continuous core through the center of the bulb. By the side of this core there was another, much less developed. The leaf portion of this core was hardly differentiated from the

* This was part of the etiolation experiments by Dr. D. T. MacDougal, who kindly gave the specimen to the author.

common central mass, but the runner was easily recognized as a small bud projecting downward from the bottom of the core. In Fig. 2 the two cores are shown as they appeared in place within the bulb. The smaller core is hidden beneath the larger in the first figure (2, *a*).

The two cores were united to each other and to the bulb tissue by a common stem or stalk. The stalk of the smaller core was longer than the other, as is seen in the figure (2, *b*). This stalk, or point of union between bulb tissue and sprout or vegetative tissue is not at the point nearest to the root fibers as is the case in *Erythronium*, but is at a little distance from that point. The roots form a compact bundle of fibers at the bottom, rather than at one side of the base, of the bulb. But the runner issues in the two genera (*Erythronium* and *Tulipa*) from the bottom of the immature bulbs, when produced.

VARIETAL AND SPECIFIC NAMES

BY T. D. A. COCKERELL

I am very glad to see (Bull. Torr. Club, May, p. 300) that Dr. Robinson has frankly discussed the important question of the status of varietal names; it is a question which has been overlooked or evaded by many botanists, with the result that the existing nomenclature is often inconsistent.

I am by no means prepared to admit, of course, that what is good in zoölogy is not also good in botany; and there era certain considerations which Dr. Robinson has apparently overlooked.

Generic and subgeneric names are expressions of arbitrarily-formed groups which have justification simply in their convenience. From a Darwinian standpoint, these groups must contain species which are not less related to one another than to species assigned to other genera or subgenera. There is to be, in fact, a natural continuity or contiguity, as with the inches on a foot-rule. But granting this, it is then a matter of taste or custom how large such divisions may be made. The subgenera of one generation or one author are often the genera of the next.

Species and subspecies, on the other hand, are units isolated by nature. It is not a matter of taste how many species exist, though one might imagine so, to read the current botanical literature. Ultimately we shall have to know how many forms stand physiologically isolated from one another, and these will be recognized as true species. Subspecies are similar, except that at some point the isolation is as yet incomplete. The word variety may as well be abandoned as a distinct category; but it is useful as a refuge when we do not know the proper status of a plant.

The "form" (*forma*) is really something different. As I understand it, it expresses a phase existing wholly within specific limits; a result of the variability of the organism, spontaneous or induced by external conditions. I thoroughly believe in the classification and naming of forms, as the study of these phenomena greatly assists us to understand the origin of species; but the form is not to be confused with the subspecies or variety proper. I think, myself, that even names given to forms should be recognized when it is found that they represent valid subspecies or species; but if there is to be a distinction made and a line drawn, surely it must be between the subspecies and form; not between the species and subspecies. This is the more necessary, because while we can usually (or at least frequently) tell when we are dealing with a form, it is much harder to draw the line between species and subspecies. The evidence for the status of the form may be simple and positive; that for the status of the species is negative, and to affirm that it *does not* anywhere intergrade with its nearest ally, would require knowledge that we rarely possess when describing.

The trouble about the homonyms results from the practice of suppressing a name because it has been used in a varietal sense under a different species of the genus. This seems to me an unnecessary and mischievous procedure, and I live in the hope that it will at length be universally condemned. The law of homonyms is at best a necessary evil, and it should be made to bear on us as lightly as possible.

East Las Vegas, N. M., May 26, 1901.

AN ALPINE BOTANICAL GARDEN

In a recent article published in the Revue Philomathique de Bordeaux et du Sud-Ouest, M. Henri Devaux describes most interestingly the Alpine Botanic Garden of the University of Lausanne. This Garden was founded a few years ago by Professor Wilczek at Pont-de-Nant which is situated at the entrance of the Canton du Vallais, some two hours' drive up from Bex at an altitude of 1,300 meters, surrounded by peaks and glaciers ranging from 2,500 to 2,900 meters. It is in a narrow valley protected from the east, west and north winds, but receives from the south the "Thalwind," a strong current of glacial air from the surrounding peaks, which united with the intense humidity combines to make climatic conditions favorable to the cultivation and growth of the vegetation of a much higher altitude and where such plants as *Campanula Cenisia* (2,600 m.), *Viola Cenisia* (2,000 m.), *Crepis pygmaea* (2,400 m.), and *Geum reptans* (2,500 m.) thrive. A small brook traverses the garden which with the intensely heavy dew of that high altitude is sufficient for the watering of the plants.

After many attempts Prof. Wilczek gave up the systematic arrangement of the classification of the plants growing in the Garden and resolved to form "*physiological associations*" resembling as closely as possible the biological and geographical groups found in nature. A Salicetum has been started; a collection of alpine willows with which have been planted those herbaceous plants that are grouped with them in a wild state. An alpine meadow brings together Gramineae, *Pedicularis*, and their associates. In a wood and along the brook have been cultivated such plants as *Lonicera*, *Ribes*, Maples, Ericaceae, *Rubus*, *Prenanthes*, *Dentaria*, *Lycopodium*, *Selaginella* and a multitude of ferns as well as various kinds of shade-loving Orchids, *Listera*, *Corallarhiza*, *Goodyera* and others. Rock-loving plants are planted together in an artificial rock garden where natural conditions have been copied as nearly as possible and where *Saxifraga*, *Heldreichia*, *Crepis pygmaea*, *Viola Cenisia*, *Poa minor* and others of their kind flourish. On these groups of rock a very clear

demonstration is given of the influence of surroundings and exposure on plants. Each group has of course a sunny and shaded side, a dry and a humid surface; and a notable and striking distinction is established between the vegetation of the north and south side of the same hillside. On the south side with fullest exposure to the sun and drought are established the xerophilous plants, *Potentillas*, pinks, Geraniaceae, *Artemisia Pedemontana*, *Achillea argentea*, as well as most all of the labiates. On the north side are the hygrophylous plants, *Saxifrages*, *Rhododendron*, *Mimulus*, various *Silenes*, *Valeriana Celtica*, etc.

It is thus shown in these few notes that the garden is not only a collection of alpine plants but also of alpine conditions gathered into a small space and easily accessible for study. Not the least interesting and valuable collection and certainly a unique one in its way, is that of the mosses. The region is bryologically a remarkably rich one, and the project has been formed by the Director, Professor Wilczek, and the distinguished bryologist M. Jules Amann, to list the species of mosses growing on the rocks, which after numbering the rocks, will establish a catalogue of the mosses of the valley. On many of the boulders as many as forty species have been enumerated.

A. M. V.

SHORTER NOTES.

TULIPA SYLVESTRIS IN THE FLORA OF THE UNITED STATES.—On May 6th, while driving along a thicket in a rich ravine near Sellersville, Pa., I discovered the *Tulipa sylvestris* L. growing in considerable abundance. Later it was found in the meadows a mile up the stream. Upon inquiry it was ascertained that it had been growing there for at least five years.

At the same time it was reported from Lansdale, Pa., a point ten miles from the first mentioned locality. Here it was found in a meadow, from which it had spread into an adjoining truck-patch, and thence into a wooded ravine.

It is thoroughly established in both localities, and should be included in the flora of the United States.—C. D. FRETZ, M.D.

Nocca and Cracca.—In the recently published contributions from the Gray Herbarium of Harvard University (new series), No. 20 (Proc. Am. Acad. **36** : 467), Dr. B. L. Robinson gives us a "Synopsis of the Genus Nocca." He remarks: "The name *Nocca* (given by Cavanilles in 1795 in honor of Dominico Nocca, professor of botany at Padua) is clearly the one to be employed for this genus by those who wish to apply consistently the generally conservative Berlin Rules. From the definite characterization and excellent figure given by Cavanilles there can be no doubt as to the identity of his genus *Nocca*, and the fact that the name was taken up in the same sense within fifty years by Persoon, Jacquin, La Llave, and Sweet, should establish its validity."

Dr. Robinson's acceptance of *Nocca* and his rejection of *Cracca* are inconsistent; it is clear that he construes his "generally-conservative" Berlin-fifty-year-limit-rule to suit his fancy. The genus *Cracca* was employed by Linnaeus in Species Plantarum, 1753, for six species, all subsequently referred to the later genus *Tephrosia* of Persoon, 1807; in 1769, sixteen years after Linnaeus' publication, *Cracca* was used by J. Hill in "Hortus Kewensis" for *C. Virginiana*, one of the Linnaean species, so its validity is well enough established. Of course the phonetics of these generic names are not very usual, but if Dr. Robinson can go *Nocca* there seems no good reason why he should not go *Cracca*.—N. L. Britton.

Nomenclatural Note.—New names have recently been proposed for two of the commonest plants of the Rocky Mountain region. Before accepting them as they stand, certain questions have to be raised, as follows:

1. *Castilleia alpina* (Porter). This was described as a variety of what we used to call *C. pallida*. It was said to be woolly pubescent, few-flowered, flowers almost concealed in uncolored floral leaves. It is, as I understand it, the form of the species found in the Hudsonian zone, hardly specifically separable from the plant so common lower down. Now Dr. Rydberg (Bull. Torr. Bot. Club, **28** : 29) calls the ordinary plant of lower elevations

C. luteovirens. This may be distinct from *alpina*, but whether it is or not, surely *alpina* stands.

2. *Trifolium heterodon* (Watson). This was introduced (Proc. Am. Acad. **8**: 130) as a variety of the plant we used to call *T. involucratum.* Now Dr. Greene says this is not *involucratum*, and proposes for it the name *T. Fendleri.* It seems doubtful whether *Fendleri* is a species distinct from *heterodon*, but in any case the name of prior date is valid.—T. D. A. COCKERELL.

MOSSES OF THE CATSKILL MOUNTAINS, N. Y.—The Decoration Day trip of the Torrey Club to Woodland Valley resulted in a fine collection of mosses. The best discovery was *Bryum proligerum*, which was found fruiting at one station; it usually propagates by slender, branching gemmae from the axils of the upper leaves. We also found one log covered with *Dicranum viride* in fine fruit and on one old sugar maple gathered *Zygodon viridissimus. Buxbaumia aphylla* was in fine condition on a roadside bank and on dripping ledges of a quarry were found *Bartramia OEderiana, Trichostomum tenuirostre, Homalia gracilis* and *Bryum capillare.* On Slide Mountain at an elevation of 3,500 ft., on cliffs and ledges among balsams, were collected fine specimens of *Raphidostegium Jamesii* and *R. laxepatulum; Plagiothecium striatellum* and *P. Müllerianum; Hylocomium umbratum* and *H. Pyrenaicum; Dicranum fuscescens* and *D. longifolium.*

ELIZABETH G. BRITTON.

NEWS ITEMS

Dr. Marshall A. Howe, who has recently been appointed an assistant Curator in the New York Botanical Garden, is spending the months of July and August in Nova Scotia and Newfoundland, making collections for the Garden. He is accompanied by Clifton D. Howe, Fellow in Botany in the University of Chicago, and by William Lang, a Museum Aid at the Garden.

Dr. Alexander P. Anderson, recently of Clemson College, South Carolina, and of the University of Minnesota, has been appointed Curator of the Herbarium of Columbia University.

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VANISHING WILD FLOWERS

By Elizabeth G. Britton

A number of articles on this topic have been published this year. They have awakened the interest of many readers, caused much comment and discussion, and prompted investigation as to the reasons for this calamity, which, if it does actually come to pass, is as much to be deplored as the extermination of the buffalo, the seal or the beaver. As in the case of mammals and birds, greed and thoughtlessness combine to do the harm, and fashion and selfishness are the motives.

The New York Tribune of May 5th had the following article:

"Now that spring is really here, the picnicking parties are invading the woods north of the Harlem, and have begun the annual systematic destruction of a large proportion of all wild flowers within reach. The authorities of the Botanical Gardens are on the lookout for them, and within their own precincts will guard the blossoms as thoroughly as possible under a well planned system; but the rest of the Bronx will be at their mercy, and that means death to many a poor little plant. It is not that these ruthless explorers fail to appreciate the beauty of flowers—they "just love them," in all probability. The trouble arises from their ignorance of the extent of the damage they do, and from an utter inability to comprehend that a flower or anything in the vegetable world has rights which the lord of creation himself is bound to respect. Thanks to the picnickers and alleged botanists, the arbutus, loveliest of spring blossoms, has been almost exterminated in the Bronx region. Its delicate pink and white used once upon a time to hide under the leaves all through the northern woods in that part of the suburbs; now it may be found only in spots where it commands less enthusiastic admiration. The mountain laurel has shared a similar fate."

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"The most curious feature of this destructive energy is that the plants and flowers so carelessly torn from their homes probably give little or no satisfaction to those who take them away with them. Is there, for instance, a more unsatisfactory flower to make attractive in a vase than the arbutus? It pines for its screen of leaves; the loveliness that seems so perfect when half hidden becomes quite inadequate when pulled out into the glare of the day and put down in a city room. The same is true of most other delicate wood plants. They depend upon the charm of their surroundings." In *The House Beautiful*, July, 1901.

"Is there a flower lover who has gone out into the country with a party of young people unaccustomed to find themselves surrounded with green who has not noted with something very like hopeless rage the immediate rush on every growing thing in the neighborhood, its instant uprooting and subsequent careless tossing aside? Later in the day, before going home, when all the blossoms in the immediate neighborhood have been destroyed, there is a search for fresh fields, and another spot is denuded. A few dejected blossoms are all that is left when home is reached; nothing of any value remains out of all the lives butchered to make an East Side holiday. The saddest part of it is, not that the children do it, for that might be pardoned on the score of ignorance, but that those in authority permit it without a remonstrance."

"The flower's right to existence nobody takes into account, or the harm done to the children by allowing them to think that they may destroy life as they choose."

And in this connection arises the question of public rights on private property. I know that less than fifty miles from New York, a man of wide and varied culture and sympathies, a member of a variety of horticultural and agricultural societies, owning a large tract of land away from any large town, has attempted to plant the waste roadside places and private woodland with wild and cultivated flowers, and repeatedly seen great bunches of them carried off by people, walking or driving by, who did not realize all the trouble and expense he had been to, in order to beautify the roadsides *for them* and *for others* who might come later. Many a prized Azalea bush has been rifled before its owner knew it, often thoughtlessly and without evil intention by those who "just love them."

The destruction of wild flowers not only takes place while they are in bloom but there is another cause which is even worse than picking and that is fire. In early spring, March and April, when the woods are dry and high winds prevail, a match thrown carelessly among the dry leaves will start a fire which soon attains serious proportions and is often difficult to conquer, so that in a short time nothing remains but charred stems and scorched earth from which weeds only can derive sustenance. Fires often result, in the New York Botanical Garden, from the carelessness of smokers, and they always start near the paths.

The same selfish disregard of consequences impels picnic parties to come and scatter unsightly papers, boxes and broken glass, in spite of the fact that according to the city ordinances they are guilty of a misdemeanor and liable for each offence to a fine of from one to five dollars.

These evils are due to thoughtlessness and selfishness; now let us see what fashion is doing. In the July number of the *House Beautiful* occurs the following paragraph:

"The rarest flower in Europe, the edelweiss, is becoming scarcer every year, and unless measures are taken to prevent indiscriminate gathering it is likely to disappear altogether. The edelweiss only grows 2,500 or 3,000 yards above the level of the sea and under special climatic conditions. Unfortunately, the edelweiss has become the 'fashionable' flower in Germany since the Emperor commenced wearing it."

The truth of the matter is that for commercial purposes, the wild supply of edelweiss has long been insufficient and for many years it has been impossible to gather it "indiscriminately," for it is only to be found in the most inaccessible places. But it has long been cultivated for sale to tourists and makers of souvenirs. In fact, the edelweiss is not difficult to grow in suitable localities, and even in unsuitable ones for it, such as the New York Botanical Garden, it has grown and blossomed for two years in succession, in one of the Composite beds of the Herbaceous Grounds, next to its North American allies, the everlastings and cudweeds. The living plants were obtained from the Buffalo Botanical Garden, where it has also been grown, but a succession of hot, dry summers has killed it. In the shaded and moist rock-garden yet to be built it may probably be made to live.

It would be interesting to learn how many boxes of arbutus are annually mailed in the United States and how near extermination it is at the several stations where it was formerly abundant. We know that at Lakewood there is little of it left, and we hope that George Gould will protect it within the limits of his estate. It is the only way that certain rare plants and birds have been preserved in England, and we are rapidly finding such restrictions necessary. At Natural Bridge all persons are forbidden picking wild flowers. Various places have their fashionable favorites; in the Berkshires it is the fringed gentian, in Boston the *Sabbatia*, at several places in Pennsylvania it is the *Rhododendron*, *Kalmia* and *Azalea*, and New York may well claim first place as destroyer of the Holly and *Prinos* berry. We may well ask, also, where will the Christmas trees and greens come from in the future, if they do not cultivate the balsams and spruces, and cease the reckless destruction of ground-pine and laurel. We are sending now to the southern states for most of the holly and mistletoe and to the states northeast of us for Christmas trees.

Before it became the fashion to use "Galaxy" for funeral wreaths, *Galax* was very abundant in the southern Alleghanies, but now that the leaves are picked by the crate-full, it is becoming more expensive. It is to be hoped that they do not "kill the goose that lays the golden egg."

The custom of filling jardinieres with ferns has destroyed many pretty nooks in Bronx Park and is the cause of endless trouble, as the propensity to take them and ignore the signs, seems to be a prevalent feminine failing. None of our native ferns are particularly suited to this purpose, however, and invariably need frequent renewing, so that it would be easy to exterminate any one species very soon, if the depredations were permitted and continued. In the heat of summer nothing is more beautiful and restful than a fern bank; but the sight will not be allowed to New-Yorkers if energetic folk who "must have green things about" have their way. Much care has been taken to transplant into suitably prepared nooks and crevices of the Fern corner, the rarer species and varieties of North American ferns and to surround them with beds of mosses and rocks and shade. The Walking-fern has been exceedingly difficult to establish. There are several stations for this fern within a radius of fifty miles from New

York City, but the stations are kept secret by those members of the "Torrey Botanical Club" who know them, for fear that it will be exterminated. This is the experience of a New England botanist who mourns about her losses in Rhodora for March. "We find the 'Walking-leaf'—to use Dr. Bigelow's English name for the *Camptosorus*—but a pretty habit that it has may be the death of it. Growing amongst mosses and other low plants that need but little depth of soil, and whose interlaced roots weave the whole together, it frequently carpets the flat tops of rocks—a beautiful sight which draws the attention even of idle picknickers who, not realizing that they are destroying years of growth, find it amusing to peel off these mats and then, without a pitying thought, throw them on the ground to die. Thus they have laid bare the rocks within sight of their walks; but away from the paths the interesting fern is still common."

In Connecticut the Hartford or Climbing fern was so nearly exterminated for decorative purposes that a law was passed protecting it. We hope that the newly-awakened popular interest in ferns will not lead to the same sad results, but rather cultivate the love of these beautiful plants and help to protect them.

The Natural Science Committee of the Associate Alumnae of the Normal College has been doing a good work, among the children of the East side, in distributing "Nature Material," holding flower-shows in various places and making "loan-collections" for the use of the teachers. We quote from the last Annual Report which reaches 1,500 members.

During the past year the Natural Science Committee has done all in its power to arouse greater interest in Nature Study, especially among the teachers and children of the public schools. With this object in view, the following lines of work have been carried on:

First, the distribution of "nature material" to the Alumnae School Representatives. There have been five of these distributions and the specimens have been as far as possible "according to season," that the children might come into touch with what was going on in the great world of nature, even though obliged to spend their days amid brick and mortar.

October 12, 1900. Fruits and seeds of all kinds, as well as some of the late flowers, as witch-hazel and fringed gentian.

December 7, 1900. Evergreens of many kinds, holly, ground-pine, etc.

January 16, 1901. Birds' nests, cocoons, starfish, sea-urchins, shells, minerals, etc.

February 28, 1901. Budding twigs in great variety, also mosses, lichens, fungi and sea-weeds.

April 16, 1901. Material for aquaria: frogspawn, tadpoles, snails and aquatic plants. A number of maple seedlings in paper pots were also distributed. In a number of instances barrels of labeled specimens have been sent direct to various down-town schools. "About twenty boxes and baskets were sent every week to the ten vacation schools."

"Through the distributions we reach the teachers, but by means of the flower shows we come into direct touch with the children. Last May the experiment was tried of holding a flower show in one of the down-town schools. It proved even more successful than we had anticipated and we hope to make this a permanent branch of our work, as it seems to be more far-reaching in its effects than anything else we undertake. The flowers are *enjoyed*, not only by the children of the school in which the exhibition is held, but by the neighboring schools which are invited to visit the show after school hours; the mothers of the children are asked to come, and if there chances to be a little leisure time the children from the street are invited in."

It is evident from the above quotations that such wholesale quantities as these must be judiciously selected, or there will be no wild flowers left within easy transportation of the city. One member is reported to have sent 150 *pitcher-plants* from a bog at Plymouth, Massachusetts! We question the wisdom of gathering either fringed gentians, pitcher-plants or christmas-fern, in quantities sufficient for distribution to seventy-five teachers, and we hope the pupils of country schools may be guided to make a wise selection, if they are encouraged to send flowers in quantities to the city schools.

The flowers which may be picked in large quantities, without likelihood of extermination are dandelions, violets, daisies, buttercups, black-eyed Susan, wild carrot, clovers, sweet melilot, golden-rod, asters, and grasses innumerable. But the rarer, dainty woodland wild flowers, that fade as soon as they are picked

such as spring-beauties, dogtooth-violets, bloodroot and hepaticas, columbines, anemone, arbutus and pyxie, azalea and laurel, wilk pinks, geraniums and roses and lilies and orchids, dogwood and viburnums, are far better left to reproduce their kind and add new loveliness in new places next year and for many years after. Several times since our connection with the New York Botanical Garden I have stopped children and teachers who were picking flowers or breaking branches of trees, and have been told it was for " nature study " or for " school " and when asked if they did not know it was against the rules of all public parks to pick anything, they almost invariably replied either that they had been in the habit of picking in this place before it became a Park or a Garden and did not see why they should not continue to do so ; or they implied that the object for which they were to be used justified the breach of law. The making of loan collections for the teachers is an excellent plan, and the accumulation of local floras at two or three different educational institutions also will help them. For the children, there are the Museums of National History and Botany and the Children's Museum in Brooklyn, but we hope that besides these, we shall have for a long time yet, places near the city, where the wild flowers may be seen growing and that the children of the public schools may not only learn to "*know them by name and enjoy them*," but *leave* them to continue their growth. The greatest destruction of all, comes from the draining, clearing and cultivating of wild lands ; and in the vicinity of large cities, by the continued extension of their limits ; this, of course, is unavoidable.

The Metropolitan Park Commission of Boston has printed a Flora of the parks within their jurisdiction, compiled by various local botanists who volunteered their services, organizing and coöperating for this purpose. It was published in 1896 and special localities were given for a number of rare plants, among them *Pogonia verticillata, Habenaria fimbriata, Epigaea repens, Kalmia latifolia* and *Conopholis Americana* and in the preface we find the following references to them : "The public should be exhorted, if they come across such plants as these, to preserve them rigidly. The true botanist and lover of nature needs no such exhortation."

It would be interesting to know, whether any injurious results

have followed its publication, or whether the Boston public has reached such a high degree of culture both moral and aesthetic that no one makes an exception even of himself?

But the climax has been reached in an advertisement which has been printed in *Rhodora*, the Journal of the New England Botanical Club, since May. It announces that on the Bangor and Aroostook Railroad, there is to be had the "best botanizing in the Eastern States," and proceeds to give the names of stations and lists of rare plants to the length of two whole pages. We ask with amazement, where did they get the information? What botanist sold his birthright for a few railroad passes? Fortunately, many of the plants listed are so rare that only the discriminating and trained botanical specialist will be sure to find them, and the general public will hunt a long time and not know them when they see them.

Mr. Redfield used to tell the story of Rafinesque that when he first found *Corema Conradii*, he threw himself down upon it and stretching out his arms, said "all that I cover is mine." It is not always the most enlightened who are the most unselfish. There have been botanists, even in the Torrey Club, who uprooted plants wantonly and made no good use of them after they were picked. But the custom of carrying "tin trunks" has been largely superseded by presses, and only a few duplicates are now made of each species.

The flora of Great Britain is, perhaps, the best known of any in the world; and there is more knowledge among the working people of special and difficult branches of botany, probably than in any other country, Germany not excepted. Dr. Braithwaite told me that he had sold a great many copies of the *British Moss-flora* to the Manchester weavers.

But many of their rarest plants have been exterminated by botanists, as shown by the following quotations taken from the *Journal of Botany* for July:

"The accuracy in general matters for which the *Daily Mail* has long been conspicuous, extends to its botanical information. We reproduce the most recent item in the hope that the publicity now given to the methods of the 'professional botanist' will cause him to abstain from this nefarious means of adding to his income.

"Four of the daintiest of English wild plants are rapidly dis-

appearing from this country, and one, at any rate, can rarely be seen outside Kew gardens. This is the *Cypripedium Calceolus* commonly known as the 'lady's slipper.' It is really a wild orchid, with a pretty yellow flower resembling in shape the article which has given it its popular name. The other vanishing plants are the *Osmunda regalis*, the *Scolopendrium vulgare* (hart's tongue), and the *Asplenium viride* (green spleenwort), all of which are ferns. Their disappearance is due to the depredations of the tourist, especially of the cyclist, and the professional botanist, who scours the woods and disposes of his 'finds' for a few pence in the streets of the nearest large town."—*Daily Mail*, June 26.

"There can, however, be little doubt that, apart from the ravages of 'professional botanists' and the destructive efforts of various local bodies, who throughout the country are engaged in destroying grassy roadsides and scarifying hedgebanks, to the great advantage of the nettles, docks and other weeds which take the place of the native vegetation, our British plants are threatened with a new danger."

"I have before me the programme of the Essex Technical Instruction Committee for Field Studies in Natural History. The course for 1901 is intended to instruct teachers in the elements of botany by means of rambles in search of wild flowers. One leading feature is a vacation course of ten days in the New Forest. The teachers are to be accompanied by local guides, and their attention is particularly directed to the rarest species, which are specially named, as well as the places in which they are known to grow. To collect, dry and identify plants is the chief aim of the leaders, who not only urge every teacher to make his own collection, but suggest that duplicate plants will prove useful for 'special fascicles.' It seems to me lamentable that teachers should be advised to study natural history by schedules, and to gather plants merely in order to name and dry them. I imagine that they will be worse and not better for working through so dry and barren a course. Nothing shows the want of judgment of the promoters more clearly than that untrained botanists should be seriously advised to pay particular attention to the difficult and uncertain subspecies of the common bramble. But all of us, whether we are concerned with the teaching of botany or not, have an interest in the preservation of

our native plants. The Essex Committee is simply organizing a raid upon plants which are already near to extinction. I hope that they will fail to discover the rarities which they selfishly covet; their enterprise is, I venture to say, an injury to natural history and to education alike. It may not be too late to get this programme cancelled, and I would beg those who care for live natural history to use their influence in diverting the attention of the Essex collectors to some other pursuit where they will do less harm."

ON SCIRPUS ROBUSTUS PURSH AND CERTAIN OF ITS NEAR ALLIES

By Eugene P. Bicknell

A recent article by Mr. M. L. Fernald in *Rhodora*, 2: 239 ("Representatives of *Scirpus maritimus* in America") brings to notice a common eastern bulrush hitherto concealed under the species *Scirpus robustus* Pursh.

Mr. Fernald's paper, of much interest in itself, was of particular interest to me for the reason that this same bulrush clearly announced itself to me in the field several years ago, when I was led over the same technical ground traversed by Mr. Fernald's more recent study, and to conclusions similar to but not identical with those there expressed.

Mr. Fernald's conclusion is that the new plant is related to *Scirpus robustus* as a variety, by which term I understand a state or condition of that species or a tendency of the plant, from whatever cause, to express itself in a particular form more or less divergent from the recognized type.

My own conclusions were that the plant was probably not a very remote derivative, or ancestor, of *Scirpus robustus*, but that the two plants had, nevertheless, reached a condition of organic separateness—of individualization—which could be rightly expressed only in terms of absolute distinctness at species. Here was a case, it seemed to me, one of many, indeed, where extremely close relationship would probably refuse to be transformed under any conditions of environment into actual organic identity.

Mr. Fernald finds this new eastern plant to be identical with the *Scirpus paludosus* A. Nelson from Wyoming. This being true I cannot doubt that the plant should continue to be known

by the specific name conferred by Mr. Nelson rather than by the varietal form proposed by Mr. Fernald.

My own observations on the two plants were made near Van Cortlandt, New York City, where both occurred near together in the same marshes, *S. robustus* mostly along muddy ditches, *S. paludosus* on the open salt meadows or along their borders. I have since found *S. paludosus* abundant on muddy or sandy flats along the coast as far east as Mt. Desert.

Not the least noteworthy distinction between the two plants where they occur together is in their time of flowering, *S. paludosus* coming into bloom three or four weeks before its near relative, sometimes being in full bloom while yet its companion species shows not the first signs of developing spikes. I have found it blooming as early as the third week in May, while the spikes of *S. robustus* do not usually appear until towards the middle of June. Furthermore *S. paludosus* often or usually grows in close colonies, *S. robustus* in scattered groups. My field notes record the following comparative differences between the two as they occur at New York: *S. robustus* is habitually much taller and more leafy, mostly with longer and broader leaves and stouter culms; *S. paludosus* is lower and stiffer, with much shorter and narrower leaves. It is in fact often extremely slender throughout, and though becoming 6 dm. or more tall often bears dense clusters of fruiting spikes when only a few inches high. *S. robustus* becomes 1.5 meters tall, and small examples are usually sterile or only imperfectly floriferous. The dense clusters of mostly ovate, sessile spikes have already been described by Mr. Fernald. In addition I find the scales to be usually darker and relatively shorter, finally becoming more lacerate and the achenes often also darker, thicker and more broadly obovate or sub-orbicular, and the styles shorter. The underground tuber-bearing stems also appear to be quite constantly shorter than those of *S. robustus*.

S. paludosus has undoubtedly much the habit of *S. campestris* Britton, of the prairie region, which is also rated by Mr. Fernald only a variety of *S. robustus*. Of the perfect distinctness of *S. campestris*, however, I can feel no doubt after the examination of fully matured examples showing a form of achene which in

greater narrowness and more pointed apex, besides duller color, was unmistakably different from that of *S. robustus.*

The purpose of this paper, however, is not to announce a mere want of exact accord in the results of two independent studies of the plants in question but rather to bring out the existence of still another New England bulrush of the *S. robustus* group certainly very distinct from any other at present recognized. This plant was collected by me in mature fruit August 20, 1898, on the shore of Somes Sound, Mt. Desert, Maine, growing in company with *S. paludosus.* This plant may appropriately bear the name of Mr. Fernald, through whose critical industry the old genus *Scirpus* in New England has become scarcely recognizable in its lineaments of to-day.

Scirpus Fernaldi sp. nov. Rather pale green, from 4–8 dm. high, the slender culms sharply three-angled and striate: stem-leaves long and narrow, the longer ones equalling or surpassing the inflorescence, 2–6 mm. wide, slenderly attenuate: primary involucral leaf erect, mostly 15–20 cm. long: spikes rather pale, short-ovate or finally broadly ovate, mostly 10–15 mm. long, 1–3 in a sessile or stipitate cluster and 1–5 solitary, on slender stiffy flexuous or crinkled, wiry, diverging peduncles 2–7 cm. long: scales finely close-puberulent, the lower ones often rather widely ascending, membranous, acuminate, entire or bifid or becoming lacerate, the midvein excurrent in a slender flexuous or recurved awn 3–12 mm. long: achene rather yellowish-brown and shining, broadly truncated, obovoid-cuneate, 2.5–3 mm. long, and broad, usually slightly longer than broad, almost equally trigonous or slightly depressed trigonous, the angles rounded or the dorsal swelling more or less umbonate, short-mucronulate and sometimes slightly retuse, the slender style several times the length of the achene, bearing three slender stigmas; bristles shorter than or subequal with the achene.

Type in herbarium of the New York Botanical Garden.

The pale, short-ovoid spikes, some of them on slender, elongated peduncles, and bluntly trigonous achenes, mark this plant off distinctly from all of its near allies.

A WEEPING CRATAEGUS

By John K. Small

Several years ago Mr. A. H. Curtiss sent me specimens of a very slender *Crataegus* which he had collected near Crestview in

western Florida. A year later the collectors of the Biltmore Herbarium secured more complete specimens from the same locality, some of which, together with the field notes, Mr. C. D. Beadle has kindly placed in my hands. The species may be characterized as follows:

Crataegus lacrimata

A small tree 4–5 meters tall, with a single trunk 1–2 dm. thick, or more frequently with several main stems 1–2 meters long, the branches "weeping." Bark of the branches gray, often slightly scaly: branches and twigs zigzag, armed with thorns or thorn-like spurs 1–3 cm. long: leaves numerous; blades firm or leathery, cuneate-spatulate, 1–2 cm. long, or rarely slightly longer, predominately truncate or rounded at the apex or often a few of them merely blunt or acutish, toothed mainly at the apex or above the middle, with a minute dark gland terminating each tooth, 3-nerved, glabrous at least when mature, cuneately narrowed into slender finely pubescent petioles: corymbs 2–4-flowered, or sometimes developing a single flower: pedicels 8–13 mm. long, glabrous at least in age, occasionally bearing a few linear-filiform deciduous scales: hypanthium turbinate, the lower part even, the upper and more spreading part ridged: sepals 2.5–3 mm. long, about as long as the hypanthium, lanceolate or triangular-lanceolate from a triangular or more dilated base, entire, glabrous, with reddish or brownish tips, early and permanently recurving: petals 5, white, suborbicular, 5–6 mm. broad: stamens normally 20; anthers yellowish, about 1 mm. long: pomes pyriform when young, becoming globose or nearly so at maturity, yellow, orange or orange-red, with a thin but succulent flesh, crowned with a short neck representing the remains of the top of the hypanthium: mature carpels usually 3, minutely roughened, 5–6 mm. long and nearly as broad.

Along streams in pine woods, near Crestview, Florida.

Crataegus lacrimata is most closely related to *C. lepida* and like it has drooping branches with relatively short internodes; but *C. lepida* is a small thorny shrub seldom over 1 meter tall; it also differs in the glabrous or glabrate foliage and inflorescence and in the longer narrower and more attenuate bases of the leaf-blades. *Crataegus lepida* bears leaves with obovate, orbicular-ovate or nearly orbicular blades which at the time of unfolding are both pubescent and glandular, while the pedicels and hypanthium are tomentose during anthesis, whereas in the case of *C.*

lacrimata the twigs are glabrous or nearly so, the leaves with their narrow blades only slightly if at all pubescent, except on the petioles, and not glandular, while the pedicels and the hypanthium are glabrous. The types pecimens (Biltmore Herbarium no. B 17 and B 969) are in the Herbarium of the N. Y. Botanical Garden.

The plants flower during the first half of April, good flowering specimens having been collected on April 8, 1899, while the fruits ripen after the middle of August and have fallen, usually before the first of September.

REVIEWS

Seed Plants*

The first part of the "Morphology of Spermatophytes" deals with the Gymnosperms alone, and is presented as the outgrowth of a course of lectures and laboratory work at Chicago University. A chapter is devoted to each of the four orders, Cycadales, Ginkgoales, Coniferales and Gnetales. In the sections of these chapters on vegetative organs there are a number of half-tone habit illustrations from photographs but the majority of original illustrations are those of the development of the ovule and pollen grain in *Pinus Laricio* by Chamberlain.

The chapter on the Conifers is naturally the most detailed, both from the present importance of the group in the temperate zone, and since more morphological and cytological work has been done on it. The Gnetales are treated purely from comparison of literature owing to difficulty in obtaining material. The internal treatment of each group is what one would expect, dealing first with the vegetative organs including a limited amount of anatomy, more especially of the stem. The spore-producing members, the gametophytes and the embryo are the other sections of these four chapters. One realizes in comparing the review of the embryology of the four groups how much work is still to be done in tracing the stages of the development of the critical regions of the embryo itself. The authors have, it seems, not added to our knowledge on this point. The question of the possible homologies of the ovuliferous scale and bract is considered at some length and a working decision given in favor

* Coulter, John M., and Chamberlain, Charles J. Morphology of Spermatophytes. Part I. Gymnosperms, 8vo., pp. x + 188. D. Appleton & Co., N. Y., 1901. Price, $1.75.

of regarding the scale as a carpel rather than with Celakovsky, as an outer integument.

The remaining four chapters of the book are a comparative summary of those preceding, with two devoted respectively to fossil gymnosperms and geographical distribution. The fossil forms are treated practically from the standpoint of Scott and there are new illustrations of *Cycadeoidea* from the preparations of Wieland, of Yale. One looks perhaps for a rather more thorough treatment of the intermediate group of Cycadofilices from which, according to the authors, the cycads are derived through the Bennettitales, while the Ginkgoales and Coniferales originate through the Cordaitales. This phylogeny looks to the Filicales as the ancestral group of the Gymnosperms because of the close similarity of the Cycads and Cycadofilices.

The book serves as a very convenient and up to date summary of the literature of the subject; a separate bibliography is given for the five more important chapters and a complete bibliography at the end of the book. The references from the text are made, however, by numbers corresponding to the chapter bibliography, which is not as convenient for the reader as footnotes; and the chronological arrangement of even the shorter bibliographies seems unnecessary. The half-tone illustrations are not always as satisfactory as the older line work especially for anatomical reproductions (see Fig. 47), or for such morphological details as the seedling leaf forms (Fig. 42), of which the arrangement as a whole is excellent. The book undoubtedly provides a useful and concise review of the present knowledge of Gymnosperms.—

LOUISE B. DUNN.

Practical Text-Book of Plant Physiology. By D. T. MACDOUGAL, Ph.D. Longmans, Green & Co., 1901.

In this text-book the author departs somewhat from the usual arrangement of the subject found in the majority of plant physiologies. In the opening chapter on the "Nature and Relations of an Organism" are found excellently clear and concise definitions of such phenomena as rigor, irritability, tonicity, etc., which must be of great service to the student in forming a definite conception of these underlying and often not properly understood principles of plant physiology. Following this chapter are several on the relation of plants to various external agents. In the

first of these, the "Relation of Plants to Mechanical Forces," is found a very full treatment of experiments which have to do with contact stimuli—more particularly by the curling of tendrils—on which the author himself has already done much work.

The third chapter, entitled "Influence of Chemicals upon Plants," treats of this subject in its broadest aspect, including a full list of experiments on the toxic action of various salts. The title of this section may possibly be open to criticism by some, owing to the somewhat limited field which the term "chemicals" covers, in its common, though perhaps not correct, usage.

In the relation of plants to the influence of water, gravity, temperature, electricity and light is found the subject of the next five chapters. In the consideration of the influence of light the author treats it from the interesting standpoint of light as a stimulating rather than as a retarding agent in the matter of phototropic effects.

Chapter nine deals with the "Composition of the Body," or, in other words, with the substances found in plants. Following this the "Exchanges and Movements of Fluids," including osmosis, the transpiration current, etc., are taken up, while "Nutritive Metabolism" is not introduced until the eleventh chapter.

In connection with this we find the subject of the next chapter is "Respiration, Fermentation, and Digestion." Under the last-named head fall the experiments with enzymes which are very complete and practical.

The phenomena of growth in itself, aside from the growth attending curvatures, is kept until almost the last, perhaps that they may be contrasted and compared with those of reproduction, which is very fittingly the final chapter of the book. An appendix of chemical and physical tables and a copious index is included.

Throughout the book we find a clear cut and concise style which to the student will prove a great boon. Particularly are the opening sections of each chapter to be mentioned; they serve to properly orient the reader on what is to follow. When the immense ground to be covered is considered, the very complete list of experiments can but prove satisfactory and almost always well chosen. Several new contrivances, among which is a precision auxanometer, will recommend themselves to the experimenter.

H. M. Richards.

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TORREYA

September, 1901

DISTRIBUTION OF PTEROSPORA

BY D. T. MACDOUGAL

Pine Drops (*Pterospora Andromedea* Nutt.) ranges over a region extending from Mexico northward through California and the Rocky Mountain district into British Columbia, appearing east of the Mississippi River in Michigan, and ranging eastward and also southward along the Alleghany Mountains. These two apparently separate areas are probably joined by a belt extending westward through Canada above the headwaters of the Mississippi. The plant is an inhabitant of the pine or transition zone, and its climatal relations are indicated by its limits in southern Arizona, where it occurs only at elevations between 7,000 and 8,000 feet.

In the course of some recent studies on the physiology of this symbiotic saprophyte (Annals of Botany, 1899) the author was unable to obtain living specimens from eastern United States, and from facts given by correspondents and brought to light by the author, it was concluded that this species was moving toward extinction. It has become extremely rare east of the Mississippi River : not more than a dozen specimens were found in Arizona in a region three hundred miles long, and not a score have been seen in northern Idaho in two seasons' work in collecting.

During the present season, however, the writer has traversed the Mission Mountains as a member of the Biological Expedition from the University of Montana, and met this plant in great abundance. It is found at altitudes of 3,000 to 4,000 feet in the rich humus of coniferous woods, and at one place east of the southern end of Flathead Lake a hundred stalks were counted within a radius of thirty feet of the observer, and many thousands

[The exact date of publication of each issue of TORREYA is given in the succeeding number. Vol. 1, No. 8, comprising pages 85–100, was issued August 23, 1901.]

were seen in the course of a day's walk. The plant probably attains its greatest density of distribution in this locality.

The plant derives all its food material from humus by the aid of a fungus living in the roots, which form a small compact mass no larger than a golf ball. Any disturbance or departure from the conditions offered by a primitive forest would be detrimental to the growth and development of both the *Pterospora* and the fungus with which it is allied. It will, therefore, probably become extinct in eastern United States, but will retain its foothold among the western mountains until its habitats are ravaged by fire, or by clearing of the forest.

In its habitat in the Mission Mountains, *Pterospora* occurs more abundantly in a given locality than any other known chlorophylless seed plant.

TWO NEW BUSH CLOVERS (*LESPEDEZA*)

By Eugene P. Bicknell

It may well be doubted whether the notable activity of the last few years in the critical exploration and study of our common flora has yet achieved anything more than a very good beginning.

A few years ago the discovery of a new eastern species was hailed as a botanical event. Now, no season passes but a numerous progeny of new species is transplanted from nature into the pages of our botanical serials, and still in the background many others await their turn. The doors to new discovery, thought by the last generation of botanists to be barred and locked by our earlier manuals, have been easily pushed wide open, and, lo, we find a beginning where our predecessors seemed to find the end.

Among the species of *Lespedeza* that have all this time been awaiting recognition, two well-marked eastern plants may here be distinguished.

Lespedeza velutina

Erect, stout, bushy-branched above or sometimes simple, 0.5–1.25 meters high, the appressed-ascending branches mostly

not over 10–15 cm. long, densely velvety-pubescent throughout, the younger parts soft-canescent. Leaves numerous, crowded, ascending or subappressed, on short petioles mostly 3–5 mm. long, shorter than or slightly exceeding the very narrow, recurved-spreading stipules; leaflets oblong, somewhat narrowed to the base, rounded to the short-mucronulate apex, 25–40 mm. long, 8–18 mm. wide, densely tomentose-ciliate, the odd leaflet usually slightly the largest on a foot-stalk longer than the petiole: inflorescence capitate in dense clusters axillary to the upper leaves or crowded at the ends of stem and branches; heads ovoid or broadly ovoid, subsessile or on obscure petioles becoming 10–15 mm. long: corolla 6.5–8.5 mm. long, subequal with the calyx lobes; standard pure white with a crescent of suffused pink-purple streaks in the middle, oblong and partly conduplicate, nearly horizontal; wings as long as the standard, linear-oblong, narrowed to the tip, white; keel shorter, purplish-margined toward the tip: calyx-lobes linear-lanceolate, attenuate, exceeding the corolla, becoming 8–10 mm. long, densely hoary-pilose: pod oblong or narrowly rhomboid, gradually narrowed to each end, 5–6 mm. long, mostly 2.5 mm. wide, densely short-pubescent, much shorter than the calyx-lobes.

NEW YORK: Woodlawn, border of low thicket, beginning to flower from the middle to the end of August.

MASSACHUSETTS: Beach Bluff, August, 1889, *Wm. E. Wheelock.*

Type from Woodlawn, N. Y., August 28, 1898, flowers; September 25, 1898, fruit: in herb. New York Botanical Garden.

This species, although beautifully distinct from *L. capitata* Michx., resembles that common species so closely in general habit that it is not surprising it has remained undistinguished. The soft velvety pubescence covering both surfaces of the leaves and showing nothing of the appressed and silky character of that of *L. capitata* and its more western variety *sericea*, will alone always easily distinguish *L. velutina* from these near relatives.

It should be noted further that its flowering time is from two to four weeks later than that of *L. capitata*.

Lespedeza Brittonii

Densely soft cinereous-pubescent or tomentose, especially above, with finally spreading hairs, becoming sparsely pubescent below, the upper surface of the leaves thinly subappressed-pubes-

cent to glabrate : roots strong and greatly elongated : stems wandlike and widely ascending, sometimes forming dense growths several yards in extent, 0.6–1.25 meters long, simple or with numerous, short, subappressed branches above, sometimes with longer ascending branches from near the middle : leaves rather light green, thickish, on short petioles mostly 2–10 cm. long, the joints of the leaflets, especially, cinereous-tomentose ; pubescence of lower surface short-tomentulose, that of the midrib denser and more spreading, the margins tomentulose-ciliate; leaflets oblong, rounded or somewhat narrowed to base and apex, mucronulate, 20–45 mm. long, 8–20 mm. wide, the odd leaflet slightly the largest and on a petiolule 3–10 mm. long : flowering portion of stem elongated and bearing short stiffly subappressed branches and reduced leaves : cleistogamous flowers clustered on short lateral branches : petaliferous flowers short-spicate at the ends of slender peduncles 2–5 cm. long subterminal on the stem and sometimes on the branches ; spikes closely flowered, shorter than their peduncles, short-oblong or globose, sometimes appearing capitate, 10–20 mm. long : flowers very short-petioled or subsessile : corolla 6–8 mm. long, much surpassing the calyx, whitish and pink tinged with purple, which deepens to a streaky purple spot at the base of the standard : calyx-lobes linear-attenuate, 4–5 mm. long : pod ovate or oblong-ovate, abruptly acute to somewhat acuminate, 4.5–6.5 mm. long, twice the length of the calyx-lobes or less, thinly puberulent all over with short subspreading or tomentulose hairs.

MASSACHUSETTS : Boston, Muddy Pond Hills, September 10, 1892, *Edwin Faxon*, herb. Columbia Univ.

NEW YORK : Near Bronxville (two stations), in dry soil outside the borders of woods, flowering in late August and early September.

NEW JERSEY : Quaker Bridge, *C. Pickering*, Herb. Acad. Nat. Sci. Philadelphia.

Type from Bronxville, N. Y., September 4, 1893, flowers ; September 16, 1893, fruit : in herb. N. Y. Botanical Garden.

Somewhat intermediate in characters between *L. Nuttallii* Darl. and forms of *L. procumbens* Michx., but larger than either and well marked throughout as perfectly distinct.

The much smaller and normally trailing *L. procumbens* scarcely needs close comparison. *L. Nuttallii* is a smaller, normally erect and much less pubescent plant, with more delicately and freely branched inflorescence, longer and more slender petioles, thinner and broader leaflets, which are paler and appressed-pubescent beneath, more scattered inflorescence of smaller flowers in smaller

and looser less strongly pedunculate spikes, longer-pedicelled pods, which are longer, narrower and, more acuminate, with longer and more or less persistent instead of early deciduous styles, and with the pubescence coarsely appressed-hairy instead of thinly tomentulose.

It would appear that so well distinguished a plant, if not a rare species, would have been often collected unless by reason of its very brief flowering period it has escaped notice when in flower and at other times has been passed over for some common *Meibomia* which in appearance it strongly suggests.

NOTES ON LIRIODENDRON LEAVES

By Edward W. Berry

(With Plates 1 and 2)

The accompanying plates represent leaves borne near flowering buds, either foliar flower-bud-scales or the next older leaf than the bud-scale on full grown trees. Those figured on plate 1 are one-fourth natural size, and those on plate 2 are two-thirds natural size. They all serve to confirm the view previously affirmed * that the diversion of sap for other purposes causes the abbreviated Liriophyllum-like leaf-form in this genus (*i. e.*, *Liriodendron*). The broadly-winged stipular appendages of the leaf-stalk are much commoner this year (1901) than I have ever before observed them and it is quite possible that this excessive stipular development may be a correlative of the long continuous wet weather which was such a remarkable feature of the past spring. Further support of this view is furnished by the ordinary stipules which seem to average much larger in size than usual.

In some of the specimens the stipules are merely adnate, and doubtless would, in a less wet season, become entirely separated, splitting away from the petiole when it straightened, as do the winged petiolar appendages in some species of *Magnolia*. Other of the specimens however show evidence of a true persistent union between petiole and stipule.

Of Figs. 3, 6, 7, 8, 11, and 12, the only one that need be especially mentioned is the leaf shown in Figs. 6 and 7. Fig. 6 shows the entire leaf with its winged petiole, and Fig. 7 the en-

* Bull. Torr. Club, 28. S. 1901.

larged detail, to which attention is especially directed, together with a cross section of the petiole showing the fibrous margin formed by the descending lowest primary vein. The lowermost vein divides as it approaches the midrib, the upper branch joining the latter, while the lower branch is directed downward and passes along the side of the petiole, remaining distinct as a tiny fibrous margin of the latter all the way to the point of insertion of the stipular wings.

Figs. 1, 2, and 4 show specimens in which the leaf-blade has only developed sufficiently to form very small, ovate leaves which, both in shape and venation, are very similar to *Liriodendron* cotyledons, or to what I consider the ancestral type of *Liriodendron* leaf to have been. Their summits are crowned with a longer or shorter length of the persistent awn-like tip of the midrib (in Fig. 1 the latter is 5 mm. in length).

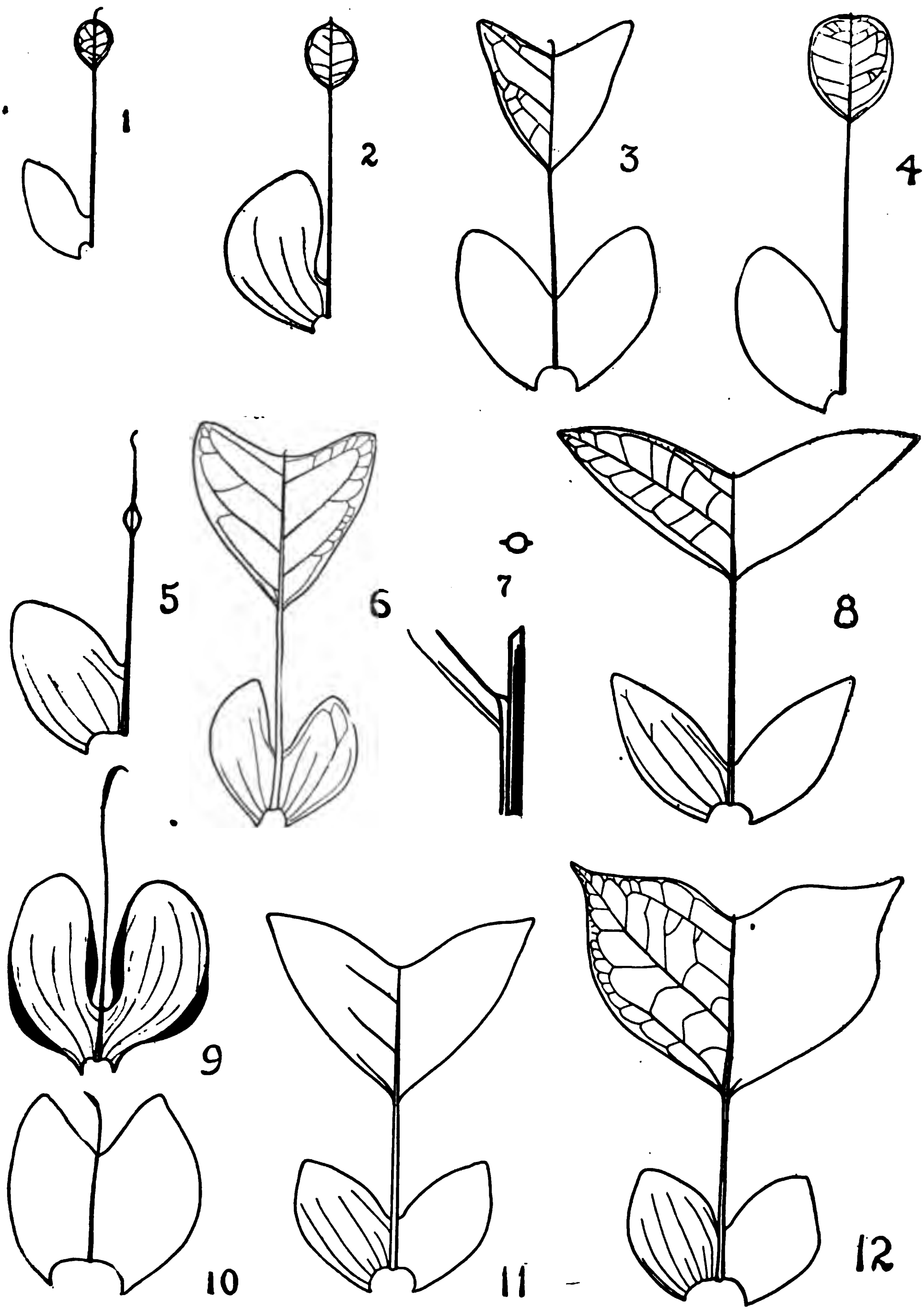
Figs. 5, 9, and 10 show what I considered after careful comparison and measurement to be anomalous flower bud-scales, before I found them in position on the tree. Afterward I found numerous specimens in position (Figs. 13 to 16).

The forms figured at 10, which are quite common, have the midrib developed for a considerable distance as a thread-like, fibrous bundle with no trace of green tissue. In those forms figured at 9, of which I have numerous specimens, the midrib is much more extensively developed, being the normal length of a true midrib, and bearing at its summit a thickened cylinder of green tissue, evidently an abortive leaf-blade.

In Fig. 5, this mass is expanded into a true leaf-blade, ovate-lanceolate in shape, and of tiny dimensions, bearing at its summit the extended midrib as an awn of 21.5 mm. in length.

Fig. 10 minus the extended midrib shows the ordinary form of the flower bud-scales which may be found in great numbers rolled up on the ground beneath the trees as soon as the buds have swollen sufficiently to cast them off.

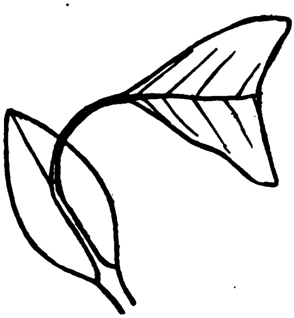
Figs. 5, 9, 10, 13, 14, 15, and 16 are especially interesting inasmuch as they are practically identical with the foliate bud-scales referred to in a previous paper (*l. c.*) as occurring in the related genus *Magnolia*.



E. W. B.

¼ nat. size.

LIRIODENDRON LEAVES



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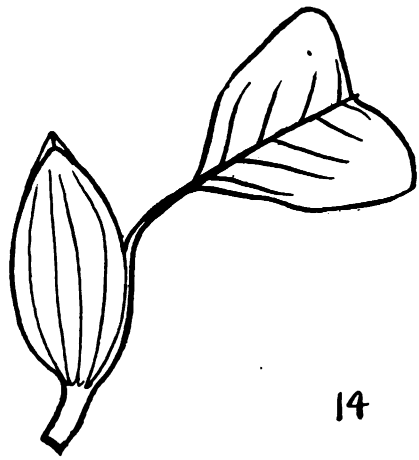

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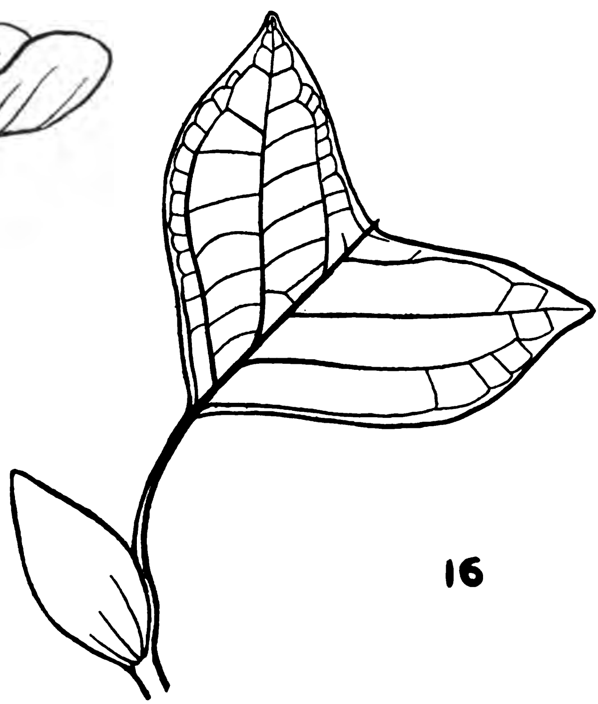

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E. W. B.

LIRIODENDRON LEAVES

It has seemed best not to enter into a detailed discussion of the foregoing specimens at this time, but simply to publish them with the hope that observers who may run across similar specimens will kindly communicate with the writer, who intends publishing a more elaborate essay on *Liriodendron* in the near future.

EXPLANATION OF PLATES

Plate 1. Leaves of *Liriodendron Tulipifera* L., from mature trees at Passaic, N. J., all ¼ natural size except Fig. 7.

Figs. 1, 2, 4. Small, primitive-shaped leaves.

Figs. 3, 6, 11, 12. Leaves with winged petiole.

Figs. 5, 9, 10. Flower bud-scale.

Fig. 7. Enlarged detail of petiole and cross section.

Fig. 8. Acutely bilobate leaf with winged petiole.

Plate 2. Leaves of *Liriodendron Tulipifera* L., from mature trees at Passaic, N. J., all ⅔ natural size.

Fig. 13. Posterior aspect of foliar flower-bud-scale.

Fig. 14. Lateral view of a similar somewhat older specimen.

Fig. 15. Posterior view of same specimen.

Fig. 16. Lateral view of a bud-scale bearing a large, more normally shaped blade and petiole.

PASSAIC, N. J.

TWO SPECIES OF CHAMAELIRIUM

BY JOHN K. SMALL

More than ten years ago Dr. Britton collected a fruiting plant of a *Chamaelirium* in the mountains of West Virginia. This specimen was seen to be characteristic, particularly on account of its large long-pedicelled capsules, but for some time nothing else in our collections appeared to correspond to it very closely. However, several years since, specimens from a number of localities have been obtained which have characters similar to those possessed by the West Virginia plant and which together with it doubtless represent an undescribed species. Therefore, the genus *Chamaelirium* becomes a genus of two species, instead of being monotypic as heretofore considered.

KEY TO THE SPECIES

Capsules oblong or ovoid-oblong, 7–10 mm. long.	1. *C. luteum.*
Capsules obovoid or oblong-obovoid, 12–14 mm. long.	2. *C. obovale.*

1. CHAMAELIRIUM LUTEUM (L.) A. Gray. Stems 2–12 dm. tall, those of staminate plants shorter than those of the pistillate,

simple: leaves mainly basal; blades spatulate or oblong-spatulate, 5–20 cm. long, tapering into broad petioles; stem-leaves usually oblanceolate to lanceolate or linear, few: racemes spike-like; staminate usually continuous, 5–20 cm. long, the tip nodding; pistillate stiff, interrupted, longer than the staminate; pedicels 1–5 mm. long: perianth (staminate) white; sepals and petals narrowly linear: capsules ovoid-oblong or oblong, 7–10 mm. long.

In open woods, Massachusetts to Ontario, Michigan, Florida and Arkansas. Spring and summer. I cite the following fruiting specimens:

NORTH CAROLINA: Roan Mountain, September 9, 1885, *Dr. and Mrs. Britton.*
TENNESSEE: Jackson, May, 1893, *Mr. S. M. Bain*, no. 173.
GEORGIA: Macon, *Dr. Boykin.*
FLORIDA: Apalachicola, *Dr. Chapman.*

2. **Chamaelirium obovale.** Stems 6–11 dm. tall, leafy at the base and to near the middle, somewhat zigzag: leaves various; basal with spatulate blades; cauline shorter, 4–15 cm. long, oblanceolate to lanceolate or linear, acute or acuminate, erect or ascending: flowers manifestly larger than those of *C. luteum:* capsules obovoid or oblong-obovoid, 12–14 mm. long, on stout club-shaped pedicels usually fully as long as the capsules or slightly shorter.

In open woods, New York to West Virginia, North Carolina and Alabama. Spring. I cite the following fruiting speeimens:

NEW YORK: Apalachin, *Mr. F. E. Fenno*, no. 396.
NEW JERSEY: Sneden's Landing, on the Palisades, 1862, *Dr. Torrey.*
WEST VIRGINIA: White Sulphur Springs, August 19, 1890, *Dr. Britton* (type); Aurora, August and September, *Mr. and Mrs. E. E. Steele.*
ALABAMA: Auburn, August 11, 1897, *Messrs. Earle & Baker.*

Chamaelirium obovale seems to be rather characteristically an Alleghanian species and, as far as we know, approaches the sea coast only near New York City. On the other hand *C. luteum* is most common in the middle and low country of the southern states.

SHORTER NOTES

THE STORING OF SEEDS BY SQUIRRELS.—At Chilson Lake, Essex county, N. Y., on June 15th, I collected a mass of white pine seedlings from a hollow at the base of a pine tree, which convinced me that a "chipmunk" had stored them there for

winter use and forgotten them. Scattered through the woods among the paper-birches, I collected also clusters of seedlings which looked as if a whole catkin had germinated just as it fell. This also was probably the work of the squirrel for the seeds usually fall out and are blown away singly. These seedlings were brought home and some of them potted just as they were; the young plants have "*thinned themselves out*," and the few that remain in each pot, lean away from each other at precisely the angle which *clumps* of birches grow in. It seems probable that this will explain why the birches are frequently found growing in this way.—E. G. BRITTON.

NOTES ON ASTRAGALUS.—One of the most common failings of manual descriptions results in leaving the student without a vivid and definite impression of the plant as a whole, segregating it and its kind from all others; in other words, a *specific* impression. One is impressed by this more and more as he does larger amounts of field work and sees the plants at home and learns to know them equally well at all seasons. The best books become then "a weariness to the flesh" at times, because of their laboratory flavor. The illustrations in Britton and Brown help notably to overcome this failing, though they can give but one form where several may be found by the investigator in the field. Two species of *Astragalus*, with which it has been my good fortune to live, fail to find their proper description in any manuals that I have seen, viz., *A. Plattensis* Nutt. and *A. Hypoglottis* L. These are both caespitose in habit, from underground stems, forming beds a rod or more in extent, possibly and probably from several parent plants. *A. crassicarpus* Nutt. and all the others with which these are botanically associated *branch from the crown* of a deep tap-root. The individual plants remain self-centered and isolated while the two of which I speak may be called gregarious. Now I wish to insist that this is the characteristic of these two species, so that with a slight knowledge in addition the collector may identify these species without waiting for fruit to mature, as otherwise he might have to do. Surely such marks as these, if known to the author, should never be omitted from any descriptions. Yet these are the very ones that are most likely to be omitted.—J. M. BATES.

NEWS ITEMS

The Macmillan Company announces the approaching publication of a "University Text-Book of Botany," by Professor Douglas Houghton Campbell.

Dr. N. L. Britton, in company with Prof. J. F. Cowell, Director of the Buffalo Botanic Garden, is spending a few weeks in St. Kitts, West Indies.

Mr. R. S. Williams left New York early in July for Bolivia, where he expects to be engaged for a year or more in botanical explorations.

Specimen pages of a catalogue of the "Pteridophyta and Spermatophyta of Southern California," by Mr. Samuel B. Parish have been issued. The volume is published by the Southern California Academy of Sciences.

"Plant Life of Alabama," a notable work by the late Dr. Charles Mohr, has appeared as Vol. VI. of the Contributions from the National Herbarium. It forms a large octavo volume of 921 pages. Dr. Mohr's death occurred on July 17th; his greatest botanical work was issued on July 31st.

Miss Olivia E. Phelps Stokes and her sister, Miss Caroline Phelps Stokes, have donated three thousand dollars to the New York Botanical Garden to be employed in special investigation into methods of protecting native plants from extermination.

The Summer School of Science for the Atlantic provinces of Canada, held at Lunenberg, Nova Scotia, has had this year an enrollment of over three hundred pupils. The botanical instruction was in charge of Mr. G. U. Hay, A.M., and Mr. J. Vroom.

Dr. Arthur Hollick, recently of the Department of Geology of Columbia University, has been appointed an assistant curator of the Museums of the New York Botanical Garden, where he will have special charge of the palaeobotanical collections.

Professor L. M. Underwood returned from Puerto Rico in the latter part of July, bringing valuable collections of living plants, seeds and dried specimens for the New York Botanical Garden. He has since been devoting several weeks to explorations in Colorado.

"*The American Botanist*, a monthly journal for the plant-lover," edited and published by Mr. Willard N. Clute of Binghamton, N. Y., is one of the latest additions to the rapidly increasing list of American botanical periodicals. The first number was issued in July.

Mr. Percy Wilson, who accompanied the Todd eclipse expedition to the Dutch East Indies in the interests of the New York Botanical Garden, reached New York again on August 20th. Among his collections are interesting exhibits for the economic museum and numerous living orchids.

The New York Botanical Garden expedition to Nova Scotia and Newfoundland returned to New York on September 9th. About 12,000 dried specimens were secured, including 4,000 of marine algae. A considerable quantity of algal material preserved in fluids was also obtained.

The department of biology of Teachers College, Columbia University, will move into new and more spacious quarters before the opening of the university in October, a complete suite of large rooms having been remodelled for its accommodation. There will be two large laboratories facing north and east, stock rooms, photographic and physiological dark rooms, and aquarium room, besides the private offices of the instructors.

Dr. Theodore Greely White, of late an assistant in the department of physics of Columbia University, died in New York City on July 7th, aged twenty-nine years. Dr. White will be remembered as a contributor of articles of merit to the *Bulletin of the Torrey Botanical Club* and the *Asa Gray Bulletin*. His chief interests during the last four or five years were in the line of geology and physics, but he had remained a member of the Torrey Botanical Club up to the time of his death.

A "Society for the Protection of Native Plants" has been organized in Boston and vicinity, and leaflets are being published by it directing attention to plants which are in special danger of becoming extinct, at least locally. These leaflets are designed for distribution to teachers in the schools and to others in position to further the aims of the society. They may be obtained by addressing Miss Maria E. Carter, Curator of Herbarium, Boston Society of Natural History, Berkeley Street, Boston.

The first meeting of the International Association of Botanists was held at Geneva, Switzerland, August 6th, 7th and 8th, under the presidency of Professor Chodat, of the University of Geneva. Complete organization was effected and a set of statutes adopted. Provision was made for the management of a periodical for the reviewing of botanical literature. The further important item of business consisted in the purchase of the *Botanisches Centralblatt*. Professor K. Goebel, of Munich, was elected President for the ensuing session and Professor F. O. Bower, of the University of Glasgow, Vice-President.

During the recent meetings in Denver, the botanical interests of the country were well represented in the Forestry Association, the Society for the Promotion of Agricultural Science, the Botanical Club, Section G of the American Association, and the Botanical Society of America. Despite the long distance which most of the botanists in attendance had to travel, many representative botanists were present and programmes of the usual length and interest were presented. A number of botanists made short field excursions in various parts of Colorado at the close of the meetings. The next annual meeting of the American Association for the Advancement of Science and the affiliated Societies will be held in Pittsburg in the latter part of June, 1902; business sessions will be held in Chicago during convocation week at the beginning of the year. Dr. D. H. Campbell was elected Chairman, and Dr. H. von Schrenk, Secretary, of the Botanical Section of the Association; Dr. J. C. Arthur was elected President of the Botanical Society of America and Dr. D. T. MacDougal, Secretary. Among the important business coming up before the Botanical Society of America, it was formally resolved:

"That it is the present policy of the Society to accumulate invested funds until the annual income, interest and dues, is at least $500, and then to use such income yearly, or at greater or less intervals, as circumstance may dictate, for the best advancement of botanical knowledge."

A committee consisting of Drs. Trelease, Britton and Robinson was appointed by the Society, to investigate and report upon the condition of the National Herbarium.

Vol. 1 No. 10

TORREYA

October, 1901

A FOSSIL NUT PINE FROM IDAHO*

By F. H. Knowlton

Some months ago I received from Mr. Waldemar Lindgren, of the U. S. Geological Survey, a fossil pine cone that had been obtained by one of his associates in the Snake River Valley, near Bernard's Ferry, Idaho. Unfortunately it was not found in posi-

Fig 1. Lateral view, showing the scales.

Fig. 2. Lateral view, showing scales with seed-cavities at their bases.

tion, having been picked up by a local ranch owner, but with little doubt it is from the Pliocene lake beds that are so abundantly exposed in that vicinity. It is silicified and in general so closely resembles material from the lake beds as to make it reasonably certain that it came from them.

* Published by permission of the Director of the U. S. Geological Survey.

[The exact date of publication of each issue of Torreya is given in the succeeding number. Vol. 1, No. 9, comprising pages 101–112, was issued September 28, 1901.]

I propose for this species the name

Pinus Lindgrenii

Cone apparently ovoid or nearly globular in shape; fertile scales very thick, 2 cm. or more broad at apex; nut oblong or obovoid, fúll and rounded at both ends, about 1.5 cm. long, and 1 cm. or a little less in diameter.

This cone, which is fairly well shown in figures 1, 2 and 3, was, as nearly as can be made out, about 5.5 cm. in length and 4 cm. in diameter. It is irregularly broken through the fertile portion, thus well exposing the large seed-cavities at the base of

FIG. 3. Basal view, showing the large seed-cavities.

the scales. The remaining scales diminish rapidly in size, those at the apex being only 4 or 5 mm. in long diameter. In several of the seed-cavities fragments of the very thin and evidently brittle shell of the seed can still be observed, and in one cavity a brownish, carbonaceous mass appears to represent the seed itself.

So far as I am now aware, this is the first undoubted nut pine to be described in a fossil state from this country. In the compact, almost globular, shape of the cone, this pine seems most closely to resemble *Pinus edulis*, but the size and shape of the scales, and the larger seeds seem to bring it closer to *P. monophylla*. Although having a cone that was apparently little if any larger than the ordinary cones of *P. edulis*, the seeds are noticeably larger than those of either this species or *P. monophylla*. The present range of *P. edulis* covers the general locality where *P.*

Lindgrenii was found, while *P. monophylla* occurs more to the southward, yet the conditions during Pliocene times may have been very different, and it is perhaps reasonable to conjecture that this fossil species was the ancestor of *P. monophylla*.

SOME POPULAR PLANT-NAMES USED IN GEORGIA

By Roland M. Harper

The following plant-names are a few of those which I have picked up in Georgia during ten years of residence and two summers of travel in the State. Every one is in common use in some part of the State, though many of them have apparently never come to the notice of botanists. They are used by people who have no knowledge of botanical literature, and have never been influenced thereby as have so many of the inhabitants of the northeastern states.

As the customs and dialects of the people vary to a considerable extent in different parts of Georgia, I have thought best to give in connection with each common name the names of one or more counties in which it is in use, so that it may be connected with some definite locality.

It is not claimed that all the following common names are new to science, but most of them have never been reported from Georgia before.

A few words of explanation are given for those names which seem to need it.

Panicum digitarioides Carpenter. Maiden cane. Decatur.

Sporobolus Indicus (L.) R. Br. Swamp-grass. Mitchell.

This is a rather misleading name.

Campulosus aromaticus (Walt.) Trin. Wild ginger. Sumter.

Smilax laurifolia L. Bamboo-vine. Sumter.

Smilax Walteri Pursh. Sarsaparilla. Sumter, Coffee.

Myrica cerifera L. Sweet oak. Sumter.

Quercus digitata (Marsh.) Sudw. Red oak. Sumter, Bulloch.

Probably confounded with *Q. rubra*, which is unknown in these counties.

Eriogonum tomentosum Mx. Dog-tongue. Bulloch.
Nelumbo lutea (Willd.) Pers. Yankapin. Decatur.
I cannot vouch for the spelling of this name. I have written it as it sounded to me.
Rubus cuneifolius Pursh. Brier-berry. Bulloch.
So called to distinguish it from various species of *Vaccinium* and *Gaylussacia* with black fruit inhabiting the same region.
Crataegus aestivalis (Walt.) T. & G. May haw. Sumter, Mitchell.
This is the best-known species of the genus in southwest Georgia, on account of its fine fruit, and seems to be the only one which has received a distinctive name.
Cassia occidentalis L. Coffee-weed. Sumter, etc.
Cassia Tora L. Coffee-weed. Sumter, etc.
These two species are universally known by this name only, wherever they occur in Georgia.
Baptisia lanceolata (Walt.) Ell. Deer-grass. Bulloch.
Baptisia perfoliata (L.) R. Br. Gopher-weed. Bulloch.
Cracca Virginiana L. Devil's shoestring. Whitfield, Sumter, etc.
Glottidium vesicarium (Jacq.) Mohr. Devil-weed. Sumter.
Meibomia Michauxii Vail. Dollar-leaf. Whitfield.
Bradburya Virginiana (L.) Kuntze. Clabber-spoon. Sumter.
So called from the shape of the standard.
Dolicholus simplicifolius (Walt.) Vail. Dollar-weed. Coffee.
This species, like *Meibomia Michauxii*, takes its common name from the size and shape of its leaves or leaflets.
Ceratiola ericoides Mx. Rosemary. Bulloch, Emanuel.
Cyrilla racemiflora L. Titi. Sumter, Bulloch, Coffee.
Cliftonia monophylla (Lam.) Britton. Titi. Bulloch, Coffee.
In southeast Georgia, where these two species occur together, no distinction is made between them by the natives.
Ilex glabra (L.) Gray. Gallberry. Sumter, Bulloch, etc.
This seems to be the only name applied to this species in Georgia.
Berchemia scandens (Hill) Trel. Rattan-vine. Sumter.
Sida rhombifolia L. Tea-weed. Mitchell.

Aralia spinosa L. Prickly ash. Clarke, Walker, Sumter.
Chimaphila maculata (L.) Pursh. Rat's-bane. Whitfield.
Gaylussacia dumosa (Andr.) T. & G. Gopher-berry. Bulloch.
Vaccinium arboreum Marsh. Sparkleberry. Coffee.
Vaccinium stamineum L. Gooseberry. Sumter.
Galax aphylla L. Colt-foot. Whitfield.
Asclepias humistrata Walt. Wild cotton. Bulloch.
Tecoma radicans (L.) DC. Cow-itch. Sumter.

Reputed to be poisonous to the touch, probably on account of its similarity in habit to *Rhus radicans*.

Cephalanthus occidentalis L. Button-willow. Sumter.
Diodia teres Walt. Poverty-weed. Sumter. Poor-land weed. Coffee. Poor Joe. Spalding.
Pinckneya pubens Mx. Maiden's blushes. Bulloch.

Doubtless so called on account of the color of its enlarged calyx-segments.

Eupatorium compositifolium Walt. Dog-fennel. Bulloch.

This and *Anthemis Cotula*, the dog-fennel of north Georgia, are not usually found in the same vicinity, hence there is little if any confusion of names.

Trilisa odoratissima (Walt.) Cass. Deer-tongue. Sumter, etc.
Pterocaulon undulatum (Walt.) Mohr. Black-root. Coffee.

The roots are said to possess valuable medicinal properties.

Gnaphalium obtusifolium L. Rabbit-tobacco. Whitfield, etc.

Known universally by this name in Georgia. The dried leaves are smoked by boys.

NEW YORK CITY.

NOTES ON LYCOPODIUM TRISTACHYUM PURSH (L. CHAMAECYPARISSUS A. BR.)

BY B. D. GILBERT

Having gathered a considerable amount of this lycopod the past summer (1901), at the station near Alder Creek, N. Y.,[1] I noticed some features which may be of interest to collectors. The neighborhood of Alder Creek is a vast bed of sand, said to be in some places sixteen feet thick. The hills, as well as the plain, are

covered with sand, but this does not prevent a fine growth of trees. The hill west of the railroad station is a good example of this and it is here that the lycopods grow in great profusion. There are four species, viz.: *Lycopodium tristachyum*, *L. complanatum*, *L. annotinum* and *L. clavatum*, besides an occasional *L. obscurum*. The most common of all these is *L. complanatum*. *Lycopodium tristachyum* grows in the woods which are composed of deciduous trees, maple, beech, birch, etc. The soil is pure sand. When you come to an open spot this species is replaced by *L. complanatum*, which does not seem to be as fond of the shade as its congener. *L. tristachyum* does not fruit so freely as *L. complanatum* and there are many barren shoots. As has been noticed before, the running stems lie below the surface of the soil, but the habit of the plant is the same as that of this whole section. It throws up single stems at intervals which, at a distance of about 2 inches from the soil begin to branch and produce fan-shaped stems covered with leaves in 4 ranks, but not flat as in *L. complanatum*. These leafy stems are much longer and slenderer and more drooping than in *L. complanatum*. There are sometimes as many as 4 long fruit-peduncles produced from different parts of the main upright stem and not in the least connected with each other, but generally growing to the same height, so that there may be an inch or two of difference in their length. At the top, each of these bears 2 to 4 spikes about an inch long, preferably 4 of them. Here again there is a difference which cannot be detected in the pressed plants. In *L. complanatum* the short pedicels of the spikes make an elbow from which the spikes stand up erect, so that in case there are 4 spikes they form an exact square, or if 3 only, then an exact triangle, the spikes standing up like candles out of a candelabrum. In *L. tristachyum* the pedicels are more slender and rise directly from the spot where they branch, without the elbow but in an oblique direction. This difference is very noticeable in the growing plant, but not particularly so in the pressed specimens.

Prof. Charles H. Peck, our New York state botanist, informs me that he has gathered *L. tristachyum* in Essex Co., N. Y., and that his impression is that it grows there more plentifully than

L. complanatum. This accords with E. J. Hill's experience related in the July TORREYA. It is quite abundant at Alder Creek also, but not to the same extent as *L. complanatum.* The long slender fingers distinguish it easily from the latter species, the digits of which are short, flat and stout.

SHORTER NOTES

SPRING FOLIAGE IN OCTOBER.—The fall tent-caterpillar, tussock-moth, and other ravenous insects have been particularly abundant this year in the parks of New York City, and the trees in Union and Madison Squares, presented a desolate and denuded appearance at the end of August. But during September most of the trees have developed a new set of leaves, so that now, in the beginning of October, they have the fresh green beauty of May. There are exceptions here and there, however, for the elms, poplars, catalpas and the thorny locust still retain their old leaves and shabby aspect, while the maples, lindens, and button-balls make a strong contrast with their fresh green foliage. The English elms have not been eaten by insects, the catalpas only occasionally, and the poplars and thorny locusts suffered more from the excessive heat and dryness of June and July, which caused them to lose many of their first leaves. The leaves which have grown since, on the extremities of the branches, are larger and more vigorous and still remain, when all the rest are fallen.—E. G. BRITTON.

FIELD DAYS OF THE TORREY BOTANICAL CLUB.—During the summer months, weekly excursions have been made by members of the Torrey Botanical Club to interesting localities in the vicinity of New York City. In order to keep in closer touch with the Club, the Botanical Garden has aimed to send on each excursion a member of its staff or an aid, who collected for the local herbarium.

On the excursion of August 17th, to Grasmere, Staten Island, S. H. Burnham represented the Garden. The following interesting plants were found : *Blephariglottis ciliaris* (L.) Rydb., in moist smilax tangles, in full bloom ; *Ptilimnium capillaceum* (Mx.) Raf.;

Koellia flexuosa (Walt.) MacM.; *Sanguisorba Canadensis* L.; *Polygala viridescens* L.; *P. verticillata* L.; *Rhexia Virginica* L.; *Dipsacus sylvestris* Huds.; *Baptisia tinctoria* (L.) R. Br., nearly out of flower; *Cuscuta arvensis* L.; *Spiraea salicifolia latifolia* Ait.; *Iva frutescens* L.; *Panicum virgatum* L.; *Rynchospora glomerata* (L.) Vahl and *Apios Apios* (L.) MacM.—S. H. B.

REVIEWS

The "Peg" or "Heel" in Seedlings of the Cucurbitaceae

For many years that curious adaptive structure known as the "peg" or "heel" which serves to open the seedcoat in seedlings of the cucurbits has been an object of study for many investigators. The extent to which this has been the case is indicated by the extraordinary number of papers which have been devoted to it, namely 531!

The last of these is from the laboratory of the Agricultural Academy at Bonn, by Professor F. Noll.* The very interesting and important results of the investigation are given below in the form of a partial translation:

As shown by Darwin, the structure in question is produced at the point of union of hypocotyl and root. Its lower half is therefore morphologically root, and the upper half stem. Qualitatively, the axis at this point is able to produce the peg on all sides. On the broad flanks of the axis, which in transverse section is elliptical, the peg develops more strongly than on the narrow flanks. Quantitatively, therefore, the axis differs in this regard in different regions of the sensitive zone.

The development of the peg, which is for the greater part confined to one side of the axis, occurs in response to two kinds of stimuli.

1. Its localized origin is on the one hand dependent on the stimulus of gravitation, and is formed on the under side. By reversing a sufficiently young seedling, a second peg may be called out on the opposite side.

* Zur Keimungs-Physiologie der Cucurbitaceen. Landwirtschaftliche Jahrbücher. 1901. 145–165. Ergänzungsband 1.

If the axis is placed in a vertical position, the stimulus of gravitation is still effective in that it produces an outgrowth which completely surrounds the axis. When the latter is placed more than 6° out of the vertical, no peg is formed upon the upper side.

The formation of the peg is the result of a peculiar and until recently unrecognized method of geotropic reaction in that the stimulus sets up a growth at right angles to the normal direction of growth, the polarity of which is displaced through an angle of 90°. This change is accompanied in the peg-forming region by a substitution of periclinal for anticlinal divisions.

2. On the other hand the formation of the peg is conditioned by the bending of the axis, in such a manner that it occurs on the concave side of the curve. In other words, as in the analogous case of the formation of secondary roots on the convex side of the curve of a primary root, the stimulus is derived from the organism itself, and is connected with its form. By appropriate experiment it is possible to separate the two stimuli, and thus to cause two outgrowths to appear on opposite sides.

Pressure and friction of the axis on the testa do not act as stimuli.

Under natural conditions the two stimuli, thus recognizable experimentally, work together in complete harmony with the result that the seedling is successfully freed from the testa at the right time. This process is most successful when the broad faces of seed are placed at right angles to the vertical; and least successful when the micropylar end is directed downwards.

The final throwing off of the testa, which prevents independent nutrition, occurs usually after 10–14 days without the help of the peg. Climatic conditions naturally affect the results favorably or unfavorably. Continuous high temperature of the substratum prevents the effective working of the apparatus by inducing a too sudden and rapid lengthening of the hypocotyl.

In planting, therefore, the seeds of cucurbits should be placed with a broad face directed downward, and the temperature of the substratum should not be kept too high.

It may be added that the nature of the stimuli, which, as indi-

cated above, are related to the form of the organism, is very obscure.—Francis E. Lloyd.

CORRESPONDENCE

Editor of Torreya.

Dear Sir: The attention of the Natural Science Committee of the Associate Alumnae of the Normal College has been called to the article which appeared in the August number of Torreya, entitled "Vanishing Wild Flowers." In that article the work of the Committee is spoken of at considerable length, and inasmuch as it is mentioned in such reprehensible company that the mere statements without explanation might lead the reader to mistaken conclusions, the Committee respectfully requests that you will kindly publish the following in your next issue:

Could the school children have the opportunity "to learn to know the flowers by name and enjoy them" as the writer of "Vanishing Wild Flowers" suggests, there would be no need of our work at all. Unfortunately, the facts are that thousands of children never have that opportunity as the following statistics prove. Out of a class of fifty-five only one knew the clover; of a class of thirty-four three did not know the daisy, twelve the dandelion; of another class seven did not know the buttercup, and of a class of thirty-five not one knew a violet. From data carefully collected we found that forty per cent. of one entire school had never been to the country and twenty-five per cent. had never even visited Central Park. It is for these unfortunates that we hold our flower shows.

The commonest flowers are wonderful to them and we make special efforts to get these in quantity and also the flowers mentioned in the poems studied in school. It was for the latter reason that we were anxious to obtain the fringed gentians. We would like to state that those mentioned in the article in question were collected in the course of a long drive, were carefully cut, and only a few were taken from each locality.

Likewise, the pitcher plants referred to were gathered from a deserted cranberry bog at Plymouth, Mass., where the supply

was practically limitless; the plants were not missed from the bog and brought pleasure untold to many a New York classroom where they were kept for months.

The holly referred to was sent from South Carolina, while all the club-mosses that the Committee has distributed have come from Canada and Lake George. The barrels and boxes of material that seem to have raised apprehension were quite innocent; with the exception of one barrel filled with daisies, they contained cones, nuts, various dried fruits and shells.

The "twenty baskets a week sent to the vacation schools" were filled almost entirely with garden flowers, the common garden vegetables, showing manner of growth, and the commonest wild flowers. These were what were especially requested.

The Christmas ferns alluded to were merely the fronds, without roots, as might be concluded from the time of year when they were distributed (December). As to the twigs, they are small ones, not more than a foot or a foot and a half long; the only large branches we have received have come from the authorities of Central Park, who have always taken the greatest interest in our work and contributed most generously whenever appealed to.

We have gathered many of the "woodland flowers" referred to, but, as they have been taken without roots and from various localities, we fail to see any diminution of either plants or flowers as a result, although the members of the Committee have had many of the stations under observation for over ten years.

As has been seen, a large part of the material we receive comes from a distance, and is, in most cases, sent by intelligent flower lovers to whom our work appeals. With very few exceptions, the collections made in the immediate vicinity of the city are made by the Committee and as judiciously as possible.

The Committee has carefully considered the question of the preservation of our rarer wild flowers, and one reason for omitting the annual botanical flower show at the Normal College last year was that the rarer plants would naturally be collected for that. We would also state that especial effort is made to educate the various field classes, held under the auspices of the Commit-

tee, to see the necessity of protecting our least common wild flowers, if any are to be left about the city.

It may be of interest to state that eight members of the Committee are members of the Torrey Club.

Repectfully yours,
MABEL H. TAYLOR,
Secretary of the Committee.

NORMAL COLLEGE, Sepembter 24, 1901.

NEWS ITEMS

Professor F. S. Earle, recently of the Alabama Polytechnic Institute, has entered upon his new duties as an Assistant Curator of the Museums of the New York Botanical Garden. Professor Earle will continue his special studies on the fungi.

The program for the autumn lectures to be delivered in the Museum Building of the New York Botanical Garden, Bronx Park, on Saturday afternoons at 4:30 o'clock, has been announced as follows:

October 12th, "Sunlight and Vegetation," by Dr. D. T. MacDougal.

October 19th, "Botany of the West Indies," by Dr. N. L. Britton.

October 26th, "Habits and Characteristics of Some of the Larger Marine Plants," by Dr. M. A. Howe.

November 2d, "Ancestral History of Some Living Trees," by Dr. C. A. Hollick.

November 9th, "Production of Cinchona Bark and Quinine in the East Indies," by Dr. H. H. Rusby.

November 16th, "Botanical Features of the Mountains of Colorado," by Dr. L. M. Underwood.

The lectures will be illustrated by lantern slides and otherwise. They will close in time for auditors to take the 5:38 train from Bronx Park railway station, arriving at Grand Central Station at 6:04.

Vol. 1 No. 11

TORREYA

November, 1901

DUPLICATION OF CONTRIBUTIONS ON PHYSIOLOGY OF TENDRILS

By D. T. MacDougal

The author of this note spent some time in making observations and experiments upon the tendrils of *Entada scandens*, the West Indian filbert, in the Botanic Gardens at Bath and Castleton, Jamaica, in the summer of 1897, and some additional anatomical work was carried out in the laboratory later in the year. A brief note containing the chief results of the experiments was read before the Indiana Academy of Science, December 30, 1897, and a detailed account of the entire investigation was published in the Bulletin of the Torrey Botanical Club in 1898 (**25**: 65–72. *f. A–F*), under the title of "Contribution to the Physiology of Tendrils."

By reference to the accompanying figures, which were omitted from the original paper it may be seen that the tendrils of *Entada* are the transformed terminal leaflets of the large bipinnate leaves. The tendrils are extremely sensitive over their entire surfaces, and curve to the most delicate touch, and the efficiency of this pair of grasping organs is far greater than that of any single tendril, due in part to their rapid action and to their combined mechanical superiority. The detail of the structure and action of these organs is given in the article cited.

Dr. Haberlandt has recently published in pamphlet form a lengthy treatment of tendrils and other sensitive organs under

[The exact date of publication of each issue of Torreya is given in the succeeding number. Vol. 1, No. 10, comprising pages 113–124, was issued October 26, 1901.]

the title of "Sinnesorgane im Pflanzenreich zur Perception mechanischer Reize (Leipsic, 1901), in which a historical résumé of the researches upon the included subjects is attempted. The larger portion of the work is devoted to "Special investigations" upon the sensory organs of various plants.

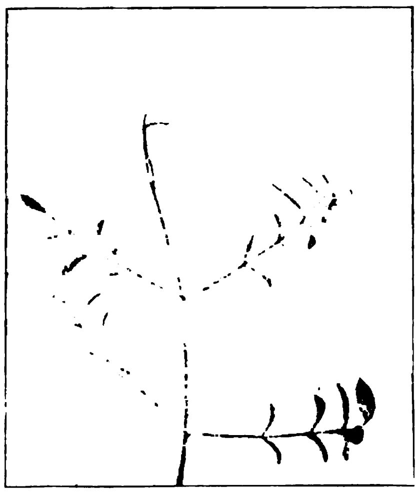

FIG. 1. Leaf of *Entada scandens* with terminal tendrils.

In this section Dr. Haberlandt describes briefly the results of his own work upon *Entada scandens* and seems wholly unaware of my own more detailed work published three years previously as noted above, to which he has not added a single fact, or generalization of any importance. He has been equally unconscious of the facts in regard to the sensory cells and perceptive organs of other tendrils described by myself still earlier in the Annals of Botany (**39**: 394. 1896). If Dr. Haberlandt's remissness consisted solely in a disregard of my published results the fault might be easily condoned, but a glance at the other sections of the treatise shows that a description of the similar omissions in regard to other work would fill a complete number of this journal.

It is truly lamentable that with such opportunity for exactness and completeness Dr. Haberlandt has written a paper historically

inadequate, and speciously misleading as to the value and priority of his own work. The bibliography of the entire subject is most easily accessible in any well-arranged botanical library. The lack of consideration to published researches is most marked with respect to articles in English and American journals, and while it may not be wilful neglect, yet it is constructive ignorance and speaks most clearly of a careless and unscientific habit of investigation, entirely inexcusable in an author of such extensive experience. Furthermore, it is indicative of a form of narrow provincialism to which the writer has had occasion to call attention more than once. (See Transmission of Impulses in *Biophytum* Bot. Centralb. 77: 297. 1899.) In the present instance it renders Dr. Haberlandt's work untrustworthy to quite a degree.

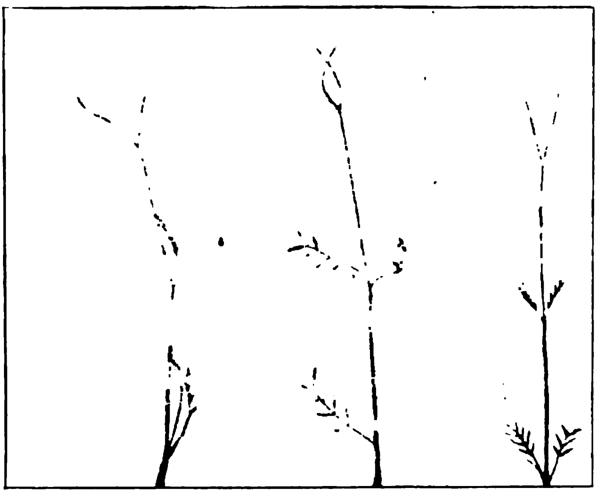

FIG. 2. Various positions assumed by tendrils of *Entada scandens*.

CRYPTOGAMIC AND PHYSIOLOGICAL BOTANY AT COLD SPRING HARBOR IN 1901

BY EDWIN BINGHAM COPELAND

The Flora.—The field work in cryptogamic botany, carried on in major part by Mr. A. F. Blakeslee, has resulted in a large

addition to the known local flora. Among Myxomycetes, which were submitted to Professor Macbride for final determination, and among Fungi, the reported flora of Long Island has been found most incomplete. The following representative genera, from the list of this season's collections, will show how remarkably rich Cold Spring Harbor is in the types usually chosen for laboratory study, and what advantages it therefore offers both for local work and for the collection of material for class use elsewhere:

Anabaena, *Lyngbya*, the Oscillarias or Oscillatorias of laboratory guides, and of course bacteria; numerous Peridineae and diatoms; all the chief genera of Myxomycetes except *Trichia*; *Volvox*, "*Proctococcus*," *Ulva* and *Monostroma*, *Spirogyra*, desmids including very large *Closterium*, *Bryopsis*, *Vaucheria*, *Cladophora*, *Bulbochaete*, *Nitella* (introduced by Dr. Johnson, now common), *Ectocarpus*, *Fucus* and *Ascophyllum*, *Nemalion*, *Agardhiella*, *Polysiphonia*; *Albugo* and *Peronospora*, *Saprolegnia*, *Sporodinia*, *Mucor* of course, and *Penicillium*, *Taphrina*, *Microsphaera*, *Peziza*, *Cordyceps*, *Ustilago*, *Puccinia*, *Uredo* and *Aecidium*, *Exobasidium*, *Stereum*, *Hydnum*, *Polyporus*, *Strobilomyces* (splendid material for the study of basidia and spores), *Coprinus*, *Amanita*, *Scleroderma*, *Crucibulum*, *Dictyophora*; *Riccia*, *Marchantia*, *Conocephalum*, *Cephalozia*, *Notothylas*, *Funaria*, *Dicranum*, *Georgia*, *Polytrichum*; *Botrychium*, *Osmunda*, *Adiantum*, *Pteridium*, abundant undetermined prothallia, *Equisetum*, *Lycopodium* and *Selaginella*. *Marsilea* is reported, but was not collected this year. Fully 80 per cent. of these grow within a quarter of a mile of the laboratory.

Geotropism of Fungus Stipes.—Work in physiological botany has been attempted at Cold Spring Harbor this season for the first time, and the wealth of unworked material has coaxed attention in various directions. The geotropism of the stipe of the Boleti and agarics—*Amanita* is excellent material—is essentially the same as that of phanerogams. All parts of the stipe are irritable, and there is no evidence that the stimulus is transmitted. But if the horizontal stipe is fastened at the pileus end, the base being free, it may curve as much as 180°; the zone of most rapid growth, and therefore of most rapid curving, moves toward the pileus, carrying the fixedly bent basal part beyond the perpen-

dicular. An egg of *Simblum* "aimed" horizontal shortly before its rupture gave rise to a horizontal mature fructification. The absence of geotropism seems to substantiate the view that the elongation of the stipe of the Phalloidei is an essentially different process from ordinary growth.

Extrusion of the Gametes of Fucus.—As is well known, the the gametes of *Fucus* are extruded from the conceptacles during low tide, while the plants are out of water. It has been suggested that the cause of their exit might be the removal of the pressure of the water. But this pressure, even at high tide, is insignificant. In reality, the *Fucus* plants shrink very appreciably during low tide. As they begin to dry, the outer layers lose some of the great amount of water which they hold by imbibition, and their consequent contraction compresses the inner layers. The pressure thus exerted against the conceptacles forces out a part of their water content, carrying along the gametes, usually before they separate from one another. Pinching a fruiting tip between the fingers has the same result. As Strasburger suggests (Praktikum, 296, 2d ed.), active gametes may be obtained for study at a distance from the coast, and are extruded when plants are removed from their vessel of sea water and allowed to dry for a few hours. Instead of having sea water shipped, I have made it for use at West Virginia University; it need not be at all accurately made. The development of the conceptacles and fruiting organs of *Ascophyllum* seems to be hastened by keeping the plants constantly submerged in standing water.

Adaptations of Spartina polystachya to Environment.—*Spartina polystachya* Willd. is the characteristic plant of the lowest tide-water zone inside the bar of Cold Spring Harbor. The lowest scattered plants grow where the tide leaves them from 3 to 3.5 hours. The lowest patches are left for about 4 hours. The best development, both in density and height comes where the ground is above water nearly half of the time. Near high tide mark the plant disappears again. Young plants then spend from one-quarter to three-quarters of their time submerged, and it may therefore be assumed that immersion for some hours does

not interfere with their photosynthesis. But the cuticle is strongly developed, and intercellular spaces are very inconspicuous in the leaf. As the plants grow taller the leaves are more of the time above water, and are stiff enough so that many of them stand erect above the surface, but when too great a length is exposed they float. Free movement of gases, when the leaves float or are submerged, is insured by the position of the stomata. These occur only on the upper surface of the leaves, where they are confined to the sides of deep and narrow clefts. The walls of these clefts are beset with papillæ, which further narrow them and increase their surface until it is practically impossible that the air in them should be driven out by water. The stomata being protected against plugging by water, the plants continue to take up carbon dioxide though entirely under water (*Cf.* Pfeffer, Pflanzenphysiologie, 1: 161, 2d ed.). As must be expected, especially from Stange's work (Bot. Zeit. 1892), the plant meets the concentration of the sea water with an over-regulation of its turgor. In the mesophyll, in a leaf reaching above high tide, I have found plasmolysis just beginning in 7.5 per cent. KNO ; in the cortex of the roots, in 7 per cent. KNO. I could find no root hairs.

SHORTER NOTES

Weeping Tomatoes.—Some days after clearing off a plot of ground in tomatoes for the past season it was observed that the places where the plants had stood were moist while all the other area was covered with the dry, finely raked earth. Upon examination it was found that this moisture was due to water that flowed from the roots of the tomato plants that had broken off and remained in the soil in the process of pulling. Further inspection showed that when a broken end of one of the larger roots chanced to extend above the soil its exposed fraction was wet and dripped water so that it glistened in the late October sun. From some roots that arched over with the broken end pointed downward the water fell in drops to the soil which was literally muddy below the live spigot.

Having other plots to clear, many of the tomato plants were

cut at the surface of the soil, and the root system in each left undisturbed in the soil. The location of all such roots could be easily seen by the wet place around them for a week after the removal of the vines. In some instances the otherwise dry soil was moist for a foot or more from the stump and decidedly muddy near the center of the wet circle.

Up to the time when the vines were removed there had been no hard frosts and the plants, still in flower, were loaded with fruit and therefore the breaking of the roots was at a time when they were active in taking up water. However, the flow was so copious that the fact is mentioned with the thought that some vegetable physiologist may find in the tomato a fruitful subject for the study of the obscure phenomenon of "bleeding" in plants.—BRYON D. HALSTED.

THE GENERATIVE DIVISIONS IN GYMNOSPERMS.*—In February, 1900, while examining a number of my slides made from the ovules of *Pinus rigida*, it was my good fortune to discover that interesting division in the pollen tube which botanists had been so eagerly seeking in conifers since the discovery of blepharoplasts in *Gingko, Cycas* and *Zamia.* Careful examination of several slides, however, failed to bring to light the "reduced blepharoplasts" which had been predicted and further search for them was abandoned; but I was impressed with the peculiar fibrous appearance of the cytoplasm and the position of the spindle in the antheridial cell. These impressions gained considerably in force when, a few weeks later, I discovered and worked out in detail the method of division in the formation of the ventral canal-cell in *Tsuga Canadensis;* † for I found these two so-called generative divisions to be at once unique and strikingly similar.

* * * * * * * * *

In brief, the two divisions occur approximately at the same time, are both unequal, and the spindles are the same in origin, development and type. In both cases the force initiating division originates below the nucleus in cytoplasm afterwards belong-

* An abstract from an address on Fertilization in Gymnosperms delivered at the Fifth International Zoölogical Congress, Berlin, August 15, 1901.

† The Development of the Archegonium and Fertilization in the Hemlock Spruce. Annals of Botany, 14: 583–607. D. 1900.

ing to the persisting functional cell; in both cases two cells are formed, one capable of taking active part in fertilization, while the other is ultimately a total loss involving only a small part of the cytoplasm of the parent cell but half of its chromatic contents. In the hundreds of cases of fertilization among gymnosperms which I have studied, the mature functional sexual cells have invariably developed from the lower larger daughter cells produced by the unequal generative divisions.—W. A. MURRILL.

CUPANIA ON PINE KEY, FLORIDA.—A specimen, labelled *Paullinia*, showing foliage and flower-buds of a tree collected many years ago by Mr. Blodgett on Pine Key, Florida, has hitherto remained undetermined in the Columbia University herbarium, Dr. Small's studies not having as yet reached Sapindaceae, and Dr. Robinson, noticing the specimen while preparing the manuscript of this family for "Synoptical Flora" disposed of it with the annotation "some other genus?"—a pertinent suggestion. I think there can be no doubt that it represents a species of *Cupania*, probably *C. glabra* Sw., which is thus to be added to the arboreous flora of the United States. Mr. Blodgett's label records that it grew on hammocks and flowered in September.—N. L. BRITTON.

FIELD DAYS OF THE TORREY BOTANICAL CLUB.—On the excursion of August 24th, along the Palisades, New Jersey, the Misses Clarke and Esterly represented the New York Botanical Garden. The following are some of the interesting plants found: *Gyrostachys gracilis* (Bigel.) Kuntze; *Silene stellata* (L.) Ait.; *Actaea alba* (L.) Mill. in fruit; *Aralia racemosa* L.; *Clethra alnifolia* L.; *Eupatorium purpureum falcatum* (Mx.) Britton; *Aster Schreberi* Nees; *Helianthus divaricatus* L., and *H. decapetalus* L.

The Club went to Mt. Vernon, August 31st, Dr. P. A. Rydberg acting as the Garden's representative. The following plants were found: *Lobelia syphilitica* L.; *Rhexia Virginica* L.; *Decodon verticillatus* (L.) Ell.; *Dioscorea villosa* L. in fruit; *Prunus serotina* Ehrh. in fruit; *Meibomia Canadensis* (L.) Kuntze; and a decumbent fruiting plant of *Rubus nigrobaccus* Bailey. Dr. Rydberg also found an interesting form of *Impatiens biflora* Walt., with pink, spotted flowers, growing with the common form which has orange-yellow, mottled flowers.

REVIEWS

Britton's Manual of the Flora of the Northern States and Canada

The most widely useful and influential books are those which summarize in convenient form for students the results of a period of notable scientific activity. Such a book we have in Dr. Britton's Manual.*

When Britton and Brown's Illustrated Flora appeared, in 1896–1898, botanists had a new and indispensable treatise on our northeastern flora, but it was bulky and expensive. The three royal octavo volumes of that work, which contained nearly 1900 pages, weighed 12½ pounds, and cost nine dollars, are now digested and compressed into a single small volume of less than 1100 pages, which weighs not quite two pounds. The pages of the new work, including the margins, are 7¾ by 5 inches, and the whole book, including the flexible linen covers, is 1⅜ inches thick. The paper is thin and the sewing is not too tight. The book stays open. These mechanical features suggest at once how usable the book will be in the field.

Compared with the Illustrated Flora in its subject matter, the Manual has shorter descriptions, omits synonymy and citations, omits figures but includes references to them, and abbreviates geographic names. The English system of measurements is replaced throughout in the Manual by the metric system. Many new species are added, based particularly on the critical work of Bicknell, Fernald, Greene, Nash, Rydberg, Scribner, and Small, besides the work of Dr. Britton himself. The Manual contains, for example, seven species of *Antennaria*, nine species of *Sisyrinchium*, and thirteen violets not figured in the Illustrated Flora.

The principal fault in the makeup of the book is the use of two indexes instead of a single index, which causes annoyance by accidental reference to the wrong one, and wastes time unnecessarily. The lack of a species index to some of the large genera will also cause annoyance, notably in the case of *Carex*,

* Britton, N. L. Manual of the Flora of the Northern States and Canada. 8vo. Pp. x + 1080. 1901. New York: Henry Holt and Company. Price, $2.25.

which includes 205 species and covers 40 pages. One typographical abnormality of the Illustrated Flora has disappeared, namely, the use of *AEsculus* for *Aesculus*. The use of the capital E was both ugly and incorrect and has been dispensed with in the Manual.

The Engler and Prantl sequence, and the many new species and new names will give to some a feeling of strangeness. He who was brought up to look for the Ranunculaceae on page 1 of his botany and now at last locates them near the middle of the book, not very far from the vile Chenopodiaceae; who must learn to discriminate ten species of *Antennaria* where the early botanists taught him there was only one; and who used to think that *Acer saccharinum* meant the sugar maple, when now it means the silver maple—he who has a feeling that unnecessary duties are thrust upon him by these new features must remember that they appear because they are right, and that the old features have been discarded because they were wrong.

Every botanist from Labrador to the Cimarron must have a copy of "Britton's Manual." He will find it a comfortable book to hold in his hand and a satisfactory book with which to name any plant from adder's tongue to blessed thistle.—FREDERICK V. COVILLE.

A popular Work on Ferns*

Mr. Clute has given us a carefully prepared and readable book on the ferns of the Northeastern States, for the subtitle, which reads "A Guide to all the native Species" has a local rather than a national significance and for that reason is misleading. The work includes a combination of ancient folk-lore about ferns, poetical allusions to ferns, mingled with an untechnical statement of their characters, habits, and haunts, not badly written, and provided with a series of accurate structural illustrations. To these are added a considerable number of full-page illustrations, some of them colored. From the artistic standpoint these full-page illustrations may be correct but as a means of illustrating the habits and especially the habitats of our ferns they are far from success-

*CLUTE, W. N. Our Ferns in their Haunts, a Guide to all the native Species. 12mo., pp. xii, 322. Illustrated. New York. Frederick A. Stokes Company.

ful. River scenes and other miscellaneous rural landscapes with a fern of some sort placed in one corner apparently as an afterthought or adaptation of the artist do not bring out the true relations of the ferns to their surroundings as might easily have been accomplished with a camera.

It is of course natural to bring this book into contrast with others of its class and particularly with Mrs. Parsons' How to Know the Ferns. It contains more folk-lore, gives evidence of more research into the old literature of ferns, presents more proof of an accurate familiarity with ferns in the field, contains less personal narrative, and its structural illustrations are a decided improvement. As a piece of book-making and artistic illustration it is also superior when that feature is considered from an artistic instead of a scientific standpoint. But as a means of knowing our ferns which is professedly one of its reasons for being, it lacks some features of arrangement that have rendered Mrs. Parsons' effort very successful.

For an untechnical book, the matter of nomenclature figures too prominently and the author may well feel the uncertainty he cannot conceal that the nomenclature he uses is either correct or final. To the majority of the class of people to whom the book will appeal it matters little what names they find so long as they have a Latin sound, for those who study ferns for more than a passing amusement will find in standard manuals the prevailing and proper nomenclature. It shows poor taste for a professed "conservative" to propose such a combination as "*Matteuccia Struthiopteris Pennsylvanica*" in advance of a proven necessity and contrary to his profession of belief. It betokens weakness of position and insincere principles, and besides could not be used since the earliest name of the American form if distinct from the European is not *Pennsylvanica*. From a botanical standpoint changes in nomenclature in a work professedly untechnical are inexcusable anyway.—L. M. UNDERWOOD.

COLUMBIA UNIVERSITY, 6 Nov. 1901.

NEWS ITEMS

Dr. Walter R. Shaw has resigned his position in Pomona College, Claremont, California, and is now botanist and entomologist of the Oklahoma Agricultural Experiment Station, at Stillwater.

Mr. F. H. Blodgett has recently been appointed assistant vegetable pathologist of the Maryland Agricultural Experiment Station.

The following statement, printed on a postal card, was received last month by members of the Linnaean Fern Chapter of the Agassiz Association. The appeal is self-explanatory, and as TORREYA is not "in politics" just at present, we republish without comment:

Fellow Members:

Vote for Mr. Gilbert. There is no comparison between the two candidates for the presidency. Mr. Gilbert is a scientist, has a wide acquaintance with the members, and the duties of the office. He lives near the center of fern lore. I am only a collector, have never attended a meeting and I am a worldly business man. I have a daily newspaper to attend, and I am a politician. In truth, I am one of the possibilities for the Presidency of the United States upon the Populist ticket in 1904 against Theodore Roosevelt. It will give me all I can do to get the nomination for the office. I am much pleased for the honor so far and would be greatly pleased to make the Joliet park the headquarters of the American fern, but the association should be continued along its present prosperous lines and its affairs should be considered far above the pleasure of any one individual. If possible I will attend the next meeting and if you like my looks I will stand for the race some other time. If any have already voted for me write quickly and have the vote changed.

JAS. H. FERRISS,

October 17, 1901. Joliet, Ill.

Vol. 1 No. 12

TORREYA

December, 1901

ON THE RELATION OF REDWOODS AND FOG TO THE GENERAL PRECIPITATION IN THE REDWOOD BELT OF CALIFORNIA

By W. A. Cannon

It is well known to all dwellers in regions which are frequently covered by fog that fog acts to conserve, as well as to increase, the general amount of moisture, and while, so far as I know, no data have been compiled touching either of these effects, they undoubtedly play an important part in the plant life of the region. This is well illustrated by the inland distribution of the redwood on the west coast of the United States. As is well known, the redwoods occur in the fog-belt of the northern half of California, and are confined in a markedly restricted manner to those portions of the coast mountain ranges, such as ravines, which, on account of favoring topographical conditions, the fog may reach. The restriction of the distribution to so narrow a zone is, perhaps, not due so much to the negative factor, the conservation of moisture already present, as to the positive one, the actual precipitation of water from the fog. While this, without question, is an important factor in the total precipitation in any region subject to fog, it becomes very much more marked, I am convinced, in that region where the redwood forests are found. The reason for this lies in the character of the foliage of the redwood. Because the leaves of the redwood are small and closely set together on the twigs, and because both twigs and leaves are relatively delicate, the boughs which they help to form are fern-like in general appearance and constitute a very effective filter, by which

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water may be "combed" out from the fog. In the effectiveness of this filtering process, which is said to be a good method for removing water from the fog, lies, I believe, an important reason why the redwood loves the zone subject to fogs. And it will be readily seen that this factor not only increases the general amount of moisture in the region, but it supplies the redwood itself with a proper amount of water at a time when there is the least rainfall, that is, in the late summer and early autumn, when the fogs are especially abundant.

So far as I know, there is no method in use for determining the amount of fog precipitation. The amount of water in a fog which extends vertically 1000 feet may be equal to 0.1 inch rainfall.* But, of course, only a small portion of this is precipitated. This amount, however, can be greatly increased if the fog is passed through such a filter as is formed by a redwood forest, and under such conditions the amount of water taken out of the fog by the trees is considerable. Two or three illustrations will show this at least approximately. I have been told by a gentleman who owned a large ranch in the redwood belt, and whose observation was quite trustworthy, that whenever there was a fog, especially if accompanied by a wind, the soil beneath the trees appeared as if drenched by a heavy rain; and that, further, in cases of fires in his forest, if a fog came up accompanied by wind, the fires could be brought under control. To any person who has seen the force and destructiveness of a forest fire this observation will appear very significant. The relation of the redwood to fog precipitation is shown in another way, which, although sufficiently *bizarre* in itself, is vouched for, and may lend a hint to a possible manner of estimating the amount of water precipitated in this manner. On the "hog-back" of the Santa Moreno mountains lives a woodchopper, in a place once heavily covered by a redwood forest, but where there is left only an occasional large tree. Like other mountaineers, he must use water for culinary purposes at least, and in lieu of a convenient spring or well he has devised a unique "tree-well." The chopper has fashioned

* Alexander McAdie, Fog Studies on Mt. Tamalpais. Pop. Sci. Monthly, 59: 535. O. 1901.

the ground beneath a large redwood into the form of a trough at the lower end of which he has placed a barrel, and I have it on good authority that in this primitive manner he obtains sufficient water for his needs. However picturesque a "tree-well" may appear, I believe, as does also Prof. W. R. Dudley, of Stanford University, who has studied these conditions for several years, that a receptacle for the water which the tree "combs" out from the fog might be so placed that it would catch nearly all of the water thus retained, in a manner analogous to that employed by the chopper, and from data thus obtained some estimate of the total fog precipitation in a redwood forest might be had. It is hardly necessary to say that in any such calculation the density of the fog, the rate of the wind, as well as the character of the forest, and other factors would have to be considered, all of which could be worked out for each time of calculation.

A comparative study of the amount of water which different species of forest trees are able to take from fog could not fail to be of interest, and may be found to be of great moment in the life processes of the denizens of the region. And may it not be that the increased amount of the total precipitation brought about especially by the redwoods as just described, and its more uniform distribution throughout the year, will prove to be an important and possibly a determining factor in reforesting a denuded redwood area?

ARE THE LEAVES OF "SIMPLE-LEAVED AMPELOPSIS" SIMPLE?

By Byron D. Halsted

A vine of *Ampelopsis cordata* Michx., growing upon my house piazza has interested me during the autumn days by the reluctant way in which it drops its leaves. It keeps them green for weeks after the leaflets of the American ivy [*Parthenocissus quinquefolia* (L.)] have taken on a blaze of colors and gone. The last-named vine, as is well known, has its leaves compounded of five leaflets and accommodates their departure by providing each leaflet with a "letter of dismissal" that is composed through the season's

growth. In other words, a line of separation is made at the base of the leaflet so that in its going it may not disturb the others that are situated close by and all at the upper extremity of the petiole. There is no disputing the convenience of this in the plant economy to the lame and lazy, for the injured and indolent may sever their connection and drift down the hedge-row, while their fellows, still green perhaps, stay longer for the finishing touches, and until the vital fluids may be withdrawn under cover of gorgeous decay.

Turning again to the "simple-leaved ampelopsis," with which we started, it is found that the same arrangement is made for the fall of the foliage. The joint is formed at the base of the blade and when the latter falls there remain the stiff petioles for some time to come. Why this double provision for the release of the leaf—first a well-formed suture at the base of the blade and another at the union of petiole with the branch? In other words, why does not this leaf, in form like a linden, observe the method of the linden, or the maple, or the oak? Shall we find an answer in a study of kinship? Because its sister, the "pepper-vine" [*Ampelopsis arborea* (L.)], of the South has compound (bipinnate) leaves and sheds them piece-meal, is that any reason why my *A. cordata* should do the same so far as it can? Its half-sister, the American ivy, we have seen, does likewise, although its leaves are compounded upon a different pattern from those of the "pepper-vine." When we come to look at the Japanese ivy [*Parthenocissus tricuspidata* (Sieb. & Zucc.)] with its leaf-blades only three-lobed usually, but sometimes three-divided, it is found that the same method obtains, and my neighbor's outside chimney has at first a leaf-shingled surface of green, then is splashed with purple, followed by a showing of stiff upturned "straws" and the bricks beneath. It is a little family trait and whether there be one or many leaflets to the blade, the parting with the mother parent is the same.

If the several species were once all in one it is possible that that one had compound leaves and defoliated by means, natural to such leaves. Then in the passing of the years the "simple-leaved ampelopsis" has acquired the present form by enlarging

one leaflet at the expense of the others so that it serves for the whole. In doing this it has not, as yet, taken on the ordinary ways of simple leaves when the time comes to loose its hold upon the vine. We might say that the leaf was still compound, with a single leaflet, or "unifoliate" as is the term used with the lemon and orange of the ordinary sorts, but not of *Citrus trifoliata*, which is evidently compound.

If we were to go far into phylogeny—perhaps beyond our depths—it might be stated that the subject of our note had early left the simple form of leaf, still adhered to by the grapes proper, became fully compound, as are now its nearest to kin, and then underwent a "degeneration," if this word is the one, and assumed a type of foliage that might easily put it in the genus *Vitis*. The stiff defoliated petioles, however, uphold its place with the compound-leaved group—a position fully maintained by other characteristics of the species.

THE SPREADING OF SOLIDAGO SPECIOSA IN THE VICINITY OF YONKERS, N. Y.

By Mrs. John I. Northrop

Previous to 1898, the only station known to me in this locality for the above plant was on the crest of the hill south of Mt. Hope Cemetery. This handsome goldenrod was always abundant there in several old fields. In the fall of 1898, I noticed that it was spreading towards the southwest in the direction of the Hudson, as a number of plants were seen on a hillside about a mile south of Hastings village. By the next year it had reached Warburton Avenue on the river bank and a few plants were noticed just across the Yonkers line. Under the date of October 3, 1900, my note-book reads: "*S. speciosa* has spread very rapidly since last year and now solidly covers the slope on the edge of the woods near the trolley terminus. It is still spreading south. It is only two years since I have seen it here at all." The same year I found that it had taken possession of a field on the western slope of the Sawmill River valley, a mile or more to the east. Here, too, only a few plants had been noticed the year before.

This year, 1901, I find it is still spreading to the south and east as a few plants were found for the first time along a roadside in the valley, perhaps a quarter of a mile away from the last-mentioned locality. It has also gained a foothold in some fields on the other side of a patch of woods still further south. The most easterly station I have found for it is the southern slope of the ridge west of Grassy Sprain Lake while the most southerly is about half a mile north of Lincoln Park on the main line of the New York Central and Putnam road. If it continues its triumphant march to the south, it will soon cross the New York City line and approach its old possessions, as there was once a station for it, I believe, on Manhattan Island.

In the two cases especially noted above it has taken *Solidago speciosa* but three years to take complete possession of new territory and the goldenrods and asters that formerly flourished there have almost disappeared. It is not only that many new plants seem to spring up but the older ones increase in size very rapidly, one transplanted to my garden more than doubling its size the second year. Many of the old plants sent up seven or eight flower-stalks this year five feet or more in height.

YONKERS, N. Y., November 15, 1901.

HESPERASTER, A GENUS OF LOASACEAE

BY T. D. A. COCKERELL

Hesperaster (Western Star); *Bartonia* Sims, Bot. Mag. **36**: *pl. 1487.* 1812. (Not *Bartonia* Muhl., a valid genus of *Gentianaceae* published in 1801.) Biennials or perennials; petals 10 or fewer, narrow and pointed, conspicuous; stamens very numerous, up to 300; leaves pinnatifid with pointed lobes; trichomes barbed; seeds numerous, mostly winged. Type **Hesperaster decapetalus** (*Bartonia decapetala* Sims, *l. c.*). The genus includes, among others, the following species:

1. HESPERASTER DECAPETALUS (Sims). In New Mexico I have found this only at Raton. The flowers open at sunset, and are visited by the larger *Sphingidae.* Just as they open they are visited also by *Bombus*, which can get into them when they are

opening, the petals affording some purchase; but after they are fully open the radiating stamens form an efficient barrier.

2. **Hesperaster nudus** (*Bartonia nuda* Pursh, Fl. Am. Sept. 328. 1814). Vespertine.

3. **Hesperaster laevicaulis** (*Bartonia laevicaulis* Dougl.; Hook. Fl. Bor.-Am. **1**: 221. 1833). Diurnal.

4. **Hesperaster Rusbyi** (*Mentzelia Rusbyi* Wooton, Bull. Torr. Club, **25**: 261. 1898). Vespertine. Its distribution in New Mexico is peculiar; I have found it in the Sacramento Mountains and around Las Vegas, where there is no *H. multiflorus.* The latter occurs at Santa Fé, Raton and in the Mesilla Valley, to the exclusion of *H. Rusbyi.*

5. **Hesperaster multiflorus** (*Bartonia multiflora* Nutt. Journ. Acad. Phila. II. **1**: 180. 1848). Diurnal. The flowers are erroneously stated by Coulter to be deep yellow. They are in reality little darker than those of *H. decapetalus.* They are freely visited by bees, especially *Perdita.*

6. **Hesperaster perennis** (*Mentzelia perennis* Wooton, Bull. Torr. Club, **25**: 260. 1898). Diurnal (?)

7. **Hesperaster pumilus** (*Mentzelia pumila* T. & G. Fl. N. Am. **1**: 535). Vespertine, according to Miss Eastwood, Proc. Cal. Ac. Sci. II. **6**: 291.

8. **Hesperaster chrysanthus** (*Mentzelia chrysantha* Engelm.; Brandegee, Fl. S. W. Col. 237). Diurnal (?).

9. **Hesperaster densus** (*Mentzelia densa* Greene, Pittonia, **3**: 99. 1896).

H. perennis (Wooton), and *H. densus* (Greene) are perennials; the others apparently all biennials. The latter is a Colorado species and has probably been confused with *H. multiflorus.* I have been greatly indebted to Dr. Rydberg for advice when preparing these notes.

East Las Vegas, New Mexico.

SHORTER NOTES

Explosive Fruits.—During the present year a portion of our experiment grounds has been in Polemoniaceae, including spe-

cies in the following genera : *Phlox*, *Gilia*, *Polemonium* and *Cobaea*, the first-named having the greatest space and the largest representation of species, including wild and cultivated representatives. The *Phlox Drummondii*, an annual of the gardens, has been in blossom for many months and has demonstrated its right to a place in the ornamental grounds, because of its ease of culture, profusion of blooms and not least for its intrinsic beauty.

Now as the freezing weather comes the end is near, but the lighter frosts of earlier nights had no disturbing effect. While the particolored blooms are still numerous, they are not sufficient to obscure the clusters of small dry stars that cover the stems, and below them the ground is covered all around with the young seedlings ready for the coming year.

It is to these "stars" that the reader's attention is called, for they are nothing other than the calyces of the phlox flowers standing open and empty upon their short stiff stems. They are like so many miniature nests from which the eggs have hatched and the fledglings have flown. This is not so figurative a statement as it first seems for each "nest" has three as the normal number of seeds, which are of large size, as seeds go, and represent the offspring as do the eggs. Here we must note a material change in the method of dispersion, for eggs take to themselves wings by hatching and the wings bear away the young. Our smooth and shiny phlox capsule as it matures separates quickly along three lines and with such force are the parts disturbed that the three seeds within are thrown out for some distance. At the same time there is a distinct sound that can be heard for several feet and as one works among the phlox plants, carrying pollen to a tiny stigma or adjusting a bag to a castrated blossom, he may feel the seeds as they are hurled against his face or rattle upon the straw of his broad-brimmed hat. When mature pods are placed three or more feet from a wall the seeds may be thrown across the intervening space. The wonder is that so small a body can possess so much explosive and expulsive power. After the vegetable mortar is fired there remains only the calyx as a sort of gun-carriage which takes on in drying the "star" above described.—BYRON D. HALSTED.

New Methods of Drying Plants.—In a recent number of *Flora* * certain improved methods of drying plants are described which, according to a note appended by Professor Goebel to the article, are highly successful.

The first method consists of using, instead of the ordinary drying paper, sheets of cotton batting. The batting is cut to regular size and then inclosed in covers of tissue paper glued along the margins. The plants are placed between layers of these sheets and then put in an open-work press. Without further changing, except in the case of very fleshy plants, the specimens are dried in two or three days. Especially delicate plants liable to be easily torn should be placed first between sheets of tissue paper alone and then laid on the driers.

The second method † is more complicated but is very rapid and is recommended especially for climates which are moist. Half an hour to an hour, or in the case of unusually fleshy plants, somewhat longer, is sufficient to dry the specimens thoroughly. The principle consists simply of this. A cylinder of tin or russia iron, say 50 cm. high by 35 cm. in diameter, and, punctured with holes like a colander, is supported over a kerosene lamp or Bunsen flame, the plants being strapped on the outside. The latter process is the one which is more or less complicated. First the cylinder is permanently covered with linen or some kind of cloth. Then a second removable cover is made, which will barely meet around the cylinder; on its edges are strips of wood provided with metal screws which can be used to draw the cloth tight.‡ Thus prepared the cover is laid on the table and the plants enclosed in several layers of filter paper placed on it. The cylinder on its side is then laid on top of the whole and the cloth with the specimens is wrapped carefully around it. The screws are then tightened, binding the whole mass to the cylinder, which is set up on end on a tripod over the flame. The drying proceeds rapidly but care must be taken not to burn the specimens. As they dry the cover loosens and must be tightened from time

* Prof. S. Rostowzew, Laboratorium Notizen. Ueber einige Methoden des Trocknens der Pflanzen für das Herbarium. Flora, **88**: 473. 1901.

† First employed by Herr Jegorow of Moscow.

‡ It is possible that the adjustable catches such as are used on "arctics" could be ed for this.

to time. The plants will be slightly curved when dried but may be readily straightened out by placing them for a short time under moderate pressure. By this method it is said that the natural colors of the plants are admirably preserved.—H. M. R.

BROMELIACEAE IN COSTA RICA.—The monograph of the Bromeliaceae by Dr. C. Mez, the great specialist, gives the number of known species in Costa Rica as 56 (in 1896). Yet the real number of species in that small country is about 300. All the genera with superior ovary are epiphytes in Costa Rica, as are also, among those with inferior ovary, the two genera *Aechmea* and *Billbergia* and a few of the genus *Hepetis*. The chief reasons why such a small percentage of the species is recognized are to be sought in the great similarity of many species and the dissimilarity of individuals of the same species at different ages and under different conditions. There are many species with a number of varieties and finally there is a complete confusion of natural hybrids among the superb large *Conostachides* of the high frost-region. For these reasons, there are few botanists and collectors who venture to take up the Bromeliaceae seriously in Costa Rica. Only after living for years in the Bromeliaceae region does one become able to recognize the types. Dr. Mez states that the same confusion exists among the smaller species of *Tillandsia* in Argentina, etc., where they have become entirely mixed by natural crossing. Another reason for the present neglect of this exceedingly interesting family is the difficulty in drying most species, especially in the wet season. Again many species have a very local distribution or are very scarce.—C. WERCKLÉ.

A TEXAN CHERRY—**Prunus eximia.** A tree becoming 26 m. tall, with wide-spreading branches and glabrous twigs. Leaf-blades relatively thin, mainly ovate, varying to oblong, oblong-lanceolate or oval, 3–8 cm. long, obtuse, or slightly acuminate, but blunt, glabrous, delicately reticulated, serrate with appressed teeth, bright green above, pale green beneath, slender-petioled: racemes drooping, 5–7 cm. long, glabrous: pedicels 4–8 mm. long, thickened upward: sepals deltoid, slightly broader than long, acute: corolla white, 10–12 mm. broad: petals orbicular-ovate: drupe globular, 8–10 mm. in diameter, purple, sweet.

In river valleys, south-central Texas. Type, *Heller*, Pl. So. Tex., no. 1592.

Related to *Prunus serotina*, from which it is distinguished by the deltoid acute sepals and by the delicately reticulated and differently shaped leaf-blades. Mr. Howard Lacy, a resident of the region where *P. eximia* grows, informs me that the fruit of the tree is sweet and much eaten by the children. He says also that it has a great attraction for bears and hogs.—J. K. SMALL.

FIELD DAYS OF THE TORREY BOTANICAL CLUB.—David S. George acted as the representative of the New York Botanical Garden on the excursion to Rockaway Park, Long Island, September 7th. A few interesting coast plants were collected, among which were *Cakile edentula* (Bigel.) Hook.; *Salsola Kali* L.; *Teucrium littorale* Bicknell, one of the recent segregates of *T. Canadense* L.; *Lechea maritima* Leggett; *Ammophila arenaria* (L.) Link, which is abundant here; *Chaetochloa glauca* (L.) Scribn. and the pretty pink-flowered *Sabbatia stellaris* Pursh.

Between Monachie and Woodridge, Bergen Co., N. J., September 21st, Mr. G. V. Nash collected *Eupatorium album* L.; *Gentiana Saponaria* L.; *Parnassia Caroliniana* Michx.; *Spartina polystachya* (Michx.) Ell.; *Cinna arundinacea* L., with purplish panicles; *Zizania aquatica* L. and *Woodwardia areolata* (L.) Moore. —S. H. BURNHAM.

A NEW COMMON NAME.—It seems that *Micrampelis lobata* (Michx.) Greene, the wild balsam-apple, mock apple, or wild cucumber, commonly cultivated and escaped in this vicinity, shares with *Bicuculla Cucullaria* (L.) Millsp. the euphonious appellation of "Dutchman's Breeches." The allusion is to the inner fibrous-netted part of the fruit, which encloses the seeds and bears a striking resemblance to a pair of wide pantaloons.

New Jersey is a good old Dutch colony and the name may be local as I never seen that it is used elsewhere. However, the plant is commonly so-called in Passaic.—EDWARD W. BERRY, *Passaic, N. J.*

NEWS ITEMS

Professor Appleton P. Lyon, a member of the Torrey Botanical Club, died suddenly at Mt. Vernon, N. Y., on November 27.

The death of Mr. Thomas Meehan, the well-known editor

and botanist, occurred at Germantown, Pa., on November 19, at the age of seventy-five years.

Dr. John K. Small and Mr. George V. Nash spent the larger part of November in southern Florida, making collections for the New York Botanical Garden.

The newspapers announce the appointment of Professor F. Lamson-Scribner, agrostologist of the Department of Agriculture, as Chief of the Insular Bureau of Agriculture in the Philippines.

Mr. Howard J. Banker, who was a graduate student in botany at Columbia University in 1898–1900, is now teaching in the Southwestern State Normal School at California, Pa.

The Society for the Protection of Native Plants has recently issued Nos. 2 and 3 of its series of leaflets for public distribution. No. 2 is a general statement of the aims of the Society, by Professor George Lincoln Goodale, and No. 3 is "A Plea for the Preservation of Our Ferns," by Mr. George E. Davenport.

The fifth annual meeting of the Society for Plant Morphology and Physiology will be held at Columbia University on Tuesday and Wednesday, December 31 and January 1. The American Society of Naturalists with which this Society usually meets holds its sessions this year at Chicago. Reports of the Society's committees on the Botanisches Centralblatt and upon the Standard College Entrance Option in Botany will be among the special features of the Columbia meeting.

ERRATA

Page 5, 7th line, *for* D. K. Gilbert, *read* B. D. Gilbert.

Page 26, 7th line from below, *for* varitable, *read* veritable.

Page 79, 12th line from below, *for* era, *read* are.

Page 81, 5th line from below, *for* Corallarhiza, *read* Corallorhiza.

Page 82, 9th line from above, *for* hygrophylous *read* hygrophilous.

Page 100, 13th line from below, *for* is, *read* are.

Page 132, 19th and 20th lines from above, *for* KNO, *read* KNO_3.

INDEX TO VOLUME I.

New names and the names of new genera and species are printed in **boldface type**.

TORREYA

MONTHLY JOURNAL OF BOTANICAL NOTES AND NEWS

JOHN TORREY, 1796–1873

EDITED FOR

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BY

MARSHALL AVERY HOWE

Volume II.

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1902

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Vol. 2 No. 1

TORREYA

January, 1902

CONSERVATION OF ENERGY IN MYCOLOGICAL CLUBS

By Lucien M. Underwood

When the mycological club idea first swept over the country it was thought by some of the less sanguine that like many other fads the interest would soon die out, but the amount of vitality possessed by some of the clubs shows an increasing instead of a decreasing interest. And in some of the clubs certain of the members have done some most interesting work; not only have they made themselves familiar with numerous species in the field but they have also been led in some cases to make permanent records of the characters of these perishable plants. The amount of energy that is put forward in a summer by any one of these clubs is astounding when considered in the aggregate and if only conserved and turned toward the accomplishment of a single point or a few objective points would soon place us in possession of most valuable information relative to our fungus-flora. One of the most needed works is a descriptive manual small enough to be taken into the field for study and complete enough to contain all the known American species of the plants it attempts to describe and provided with usable keys or synopses that will surely lead rather than mislead the beginner. Of beginners' books we already have a sufficiency. To make possible such a work as suggested will involve time and patient work, but the small army of mycological club members could add very material contributions to such a work and hasten its preparation by following the lead of some suggestions. In order to accomplish this as any other task it will require a deal of patient labor on the part of collectors and a good deal of what has been called "dead work."

[The exact date of publication of each issue of Torreya is given in the succeeding number. Vol. 1, No. 12, comprising pages 137–156, was issued December 28, 1901.]

Our present knowledge of the higher flora has been brought to its present condition by the contributions of material from hundreds of individuals all over the country. A knowledge of our mycological flora must be brought about in the same way and none are in better condition to help in this matter than these clubs whose primary object is the study of these interesting plants. In order to direct the effort of these clubs so as not to waste energy I would suggest for the present year concentration of effort on certain definite groups of genera.

I would suggest some such series as *Boletus*, *Boletinus*, *Coprinus*, *Lactarius*, *Russula*, *Hygrophorus*, *Lentinus*, and *Marasmius*. Other generic groups need not be neglected but the principal effort might be directed to the above. They are: (1) Easily recognized genera, and (2) contain for the most part edible species, and (3) in most cases are in crying need of a good descriptive synopsis of species. The form of field notes suggested in the next article will take time and patience but will place us in possession of field data that could be obtained only by fieldworkers.

Could the efforts of the clubs or of isolated individuals all over the country be directed toward these genera for one or two seasons and the results with the carefully preserved material be transmitted to a common center for collation and comparison it would serve as the basis of a fairly complete knowledge of the genera in question, their habits, variation, season, and distribution. Such combined effort would count in a single direction and results now scattered and often wasted would be saved and utilized for the help of others in the future.

COLUMBIA UNIVERSITY, January 1, 1902.

THE FIELD STUDY OF MUSHROOMS

BY F. S. EARLE

In no group of plants is careful study in the field so necessary as with the mushrooms, since their soft fleshy texture makes it impossible to prepare them for the herbarium in any way that will fully retain the characters of the fresh plant. In nearly all other groups of plants material hastily gathered and prepared in the

field can be studied at leisure in the herbarium almost as well as if it were in a fresh state. A dried mushroom, unless accompanied by full and carefully made field notes, is usually almost or quite worthless for purposes of identification or study. It is this fact more than any other that accounts for our present scanty and unsatisfactory knowledge of the mushroom flora of North America. It must not be inferred from the above that the dried specimens are useless, and can therefore be dispensed with. On the contrary, they should be prepared and preserved with great care, since they serve to interpret the descriptions, and, while not preserving fully the characters of the fresh plant, they do preserve some of them, and often besides develop quite good ones of their own. They should be dried quickly by fire-heat in a wire rack placed over a stove or lamp. They should then be stored in pasteboard boxes, and should not be moistened and pressed flat, as is sometimes advised. Before drying the plants, each lot should be carefully studied, and a full description drawn up of all the points likely to be useful in determining the species. This is time-consuming work, but upon its faithful performance the entire value of the collection will depend. In order to save time and to systematize the work, I have devised the following description-blank: *

Name
Habitat
Habit
Pileus
  size
  shape
  color
  surface
  margin
Lamellae
  attachment
  number
  shape
  color
  spores
Veil
Annulus
Stipe
  size
  shape
  surface
  color
  substance
Volva
Flesh
  color
  changes
  taste
  odor

* This is here printed in two columns merely to economize space; in Professor Earle's blank the printing stands in a single column.—ED.

When printed on slips 4½ x 8½ inches, and about fifty of them blocked together on a stiff pasteboard back, it makes a convenient pad to write on and to carry in the pocket. This blank has proved to be of great use not only in saving time but in unifying the descriptions and making them fully comparable one with another. Without some such guide and reminder one will surely omit, in writing a description, some of the above points, making a comparison of the descriptions very unsatisfactory. Even our best and most careful mycologists when writing descriptions for publication have failed in this uniformity as any one will testify who has attempted to construct keys to the species of the larger genera.

If the numerous people who are now interested in collecting the fleshy fungi would all adopt some such simple plan for unifying and preserving the results of their observations on these interesting plants there is no reason why our knowledge of them might not soon be as complete as it is of the flowering plants. The plan of using description-blanks for field study is not particularly new. Various other forms are in use by different workers. The exact form used is not important. The main thing is to adopt some simple plan that will enable the observer to record in each case all the characters that will be of use in the determination of the plant and the comparison of one species with another. Carefully dried specimens and faithfully drawn descriptions of the fresh plant are equally necessary for the proper representation of these plants in the herbarium. To be fully satisfactory these should be supplemented by photographs and by water-color sketches. It really excites the imagination to think of a large collection of these plants fully represented in each of these ways. For some purposes plants preserved wet, either in alcohol or formalin, would also be useful, but no liquid preservative has been found that is fully satisfactory and such a collection without notes would be no more useful than the dried plants alone.

NEW YORK BOTANICAL GARDEN, January 1, 1902.

THE "TENDRILS" OF THE KENTUCKY COFFEE-TREE

By Byron D. Halsted

Seeing the paper by Dr. MacDougal upon tendrils of *Entada scandens* leads me to bring to light the following note made some years ago.

Much to my surprise in examining some young leaves of the *Gymnocladus dioica* (L.), "tendrils" were found present in each case. The leaves of this leguminous plant are pinnately decompound, the sets of leaflets being in pairs although not usually opposite upon the common petiole. Between and above the uppermost pair there is a slender projection turned more or less to one side and an inch or so in length. There are similar appendages at the ends of the lateral pinnae.

In position and structure these appendages are tendril-like and as the *Gymnocladus* is a member of a family in which tendrils are not exceptional their presence here is not so surprising as might seem at first thought.

There is no apparent advantage in this structure to the plants now producing them and it becomes of only phylogenetic importance. It would seem, therefore, that at some time the ancestors of the *Gymnocladus* were truly tendril-bearing and it is to be inferred that they used them for clinging to supports. In becoming trees the members of this species lost the need of the tendril and the structure has become reduced to an abortive thread that seems useless and is evanescent. When a leaf has attained only a fraction of its full growth the vestige of the organ for clinging has disappeared.

It seems absurd that a stately tree should have at any time anything that suggests clinging to an object of support; but viewed in the light of a vanishing appendage it is highly interesting and instructive.

The same thing is true of the Honey Locust (*Gleditsia triacanthos* L.) and perhaps also of other trees of the Leguminosae.

The picture herewith sent is a sun print of portions of young leaves in which the "tendrils" may be seen.

Doctor MacDougal suggests that these prolongations of the leaf-axes may possibly be considered as degenerate terminal leaf-

lets. It is not easy to decide what they are historically or that they are not useful now to the plants that bear them.

RUTGERS COLLEGE, November 27, 1901.

A NEW TIMBER FOR RAILROAD TIES

By H. H. RUSBY

It is reported that the Pennsylvania Railroad Company has arranged for a great innovation, in the use of tropical timbers for

railroad ties. The wood which has been selected for this purpose is the "Mora" of Venezuela and the adjacent regions, not that of Central America. The botanical identity of this Venezuelan Mora is not positive. I have collected it in the lower Orinoco region, but not in a condition for specific identification. It is certainly a member of the Rosaceae and probably in the genus *Parinarium*. A fine large trunk-section exists in the Economic Museum of the New York Botanical Garden. It grows as a large forest tree, sometimes very large indeed, being four or five feet in diameter. Like most tropical trees, it grows scattering rather than gregarious. The wood is extremely hard and heavy and the bark thin and very smooth, considering the size of the tree, there being very little fissuring or bork-formation. The outer color of the bark is of a medium to dark gray, mottled with lighter patches. The wood cuts rather readily when fresh but becomes exceedingly difficult to work after it is seasoned. In the latter state it takes a somewhat purplish tinge, to which its name "Mora" is due. It is not only hard, but tough and very durable. It is due to the last-named property that its use has been decided upon. It is said to endure for a period of fifty years. It is to be remembered, however, that this durability record relates to a tropical climate. It might be assumed that it could resist decay even longer in a temperate region where certain influences are not so active as in the tropics. Upon the other hand it is to be remembered that wood in the tropics is not subject to the sudden and severe changes of temperature which must be undergone by railroad ties in this country, and the effects of which upon this wood are quite unknown. The result of this trial will prove of the greatest interest. If successful, there is no reason why numerous other hard tropical woods possessing the same properties, a number of them growing in the same region with this Mora, cannot be similarly utilized. It is stated that the cost of these ties will be about $1.50 each, which is just about double that of the ties now in use, but it seems to the writer very doubtful if the expense of securing them will not be considerably greater than this estimate.

New York College of Pharmacy.

SOME NOTES ON THE DWARF MISTLETOE

By Clifton D. Howe

Until recently the known distribution of the dwarf mistletoe [*Razoumofskya pusilla* (Peck) Kuntze] was confined to a few stations, these being in New York, New Hampshire and Pennsylvania. These stations doubtless became known through the interest immediately stimulated by the discovery of the plant at Warrensburg, New York, in 1871, and by the subsequent description of it by Peck in 1873.* In 1898 and 1899, the range of this interesting parasite was extended by its discovery in Maine, Massachusetts and Vermont. The most northern station was Fort Kent, Aroostook County, Maine. An account of these discoveries with descriptions and notes upon its habitat was published in *Rhodora* for January, 1900.

Last summer, as a member of the New York Botanical Garden Expedition to Nova Scotia and Newfoundland, the writer found *Razoumofskya pusilla* at Pictou, Nova Scotia. The host was a small black spruce (*Picea Mariana* B.S.P.), growing on the edge of a pond in the woods about one mile from the sea. A month later, August 10, 1901, he discovered another station at Bay of Islands on the western coast of Newfoundland. The trees affected were in a sphagnous swamp on the top of a rocky hill abruptly rising about 400 feet from the bay. As in the former case, the host plant was the black spruce, but the parasite was much more abundant. Twenty spruces bearing conspicuous "witches' brooms" were counted on an area of less than a half acre. The trees were small, stunted and sickly in appearance. Some of them, apparently unable to endure the parasites, combined with an inhospitable climate, had succumbed before attaining their normal size.

The locality is about thirty miles from the open ocean, being at the head of the Bay of Islands near the mouth of the Humber River. Thus the plant is to some extent protected from the extreme exposure of the coast, while at the same time it has the environment of abundant moisture which seems most favorable

* Peck, C. H. Twenty-fifth Ann. Rep. on N. Y. State Mus. Nat. Hist. 69. 1873.

to its development. An unsuccessful search for *Razoumofskya* was made at other places in Newfoundland.

The station at the Bay of Islands is very near the 49th parallel of latitude. As *Razoumofskya pusilla* is one of the outlying representatives of a chiefly southern and tropical family, its occurrence so far north seems worthy of record.

DEPARTMENT OF BOTANY, UNIVERSITY OF CHICAGO.

SHORTER NOTES

A GEORGIA RHODODENDRON.—For nearly three quarters of a century a single specimen of a *Rhododendron* related to the Alleghenian *R. punctatum* has been preserved in the Columbia University herbarium. This specimen was collected in middle Georgia by Dr. Boykin, and nothing similar to it came to my notice until Mr. A. Cuthbert sent me specimens which he collected in the spring of 1901; from shrubs growing along the Savannah River, near Augusta, Georgia.

The most conspicuous external character of this species is the relatively long corolla-tube which in this case is longer than the lobes. In the case of *R. punctatum* the lobes of the corolla are longer than the tube. A striking feature of the plant is the corolla-limb with its broad crisped lobes, the upper lobe being copiously yellow-blotched. The corolla-lobes of *R. punctatum* are of an ovate type and perfectly flat along the edges. I shall call this species after Mr. Cuthbert and characterize it as follows:

Rhododendron Cuthbertii

A slender straggling shrub 2–3.5 m. tall, with resinous-scurfy foliage. Leaves mostly at the ends of the branches; blades leathery, elliptic, 3–13 cm. long, acute at both ends, or acuminate at the apex, more or less revolute, somewhat reticulated above, scurfy beneath; petioles 1–1.5 cm. long, more scurfy than the blades, rather stout: flower-clusters quite dense: pedicels 1–1.5 cm. long, clothed with pale scales: sepals ovate, 2 mm. long: corolla mainly of a clear rose tint with some yellow near the base; tube funnelform, rather abruptly expanded near the middle, fully 1.5 cm. long; limb 3–3.5 cm. broad, the lobes suborbicular or orbicular-reniform, truncate or subcordate at the base, crisped, the upper one copiously blotched: capsule 8–12 mm. long.

On river banks, middle and eastern Georgia. Spring.

The species grows abundantly on steep gneiss slopes along the Savannah River about seven miles above Augusta. Type in the herbarium of the New York Botanical Garden. J. K. Small.

A new Mouriria from Porto Rico.—*Mouriria* Aubl. is a genus of Melastomaceae including about forty species, natives of continental tropical America and the West Indies. Of these *M. Domingensis* (Tussac) Spach, a tree with ovate pinnately-veined leaves is apparently frequent on Porto Rico, and five species are recorded from Cuba. The plant here noticed was first collected by P. Sintenis near Hatillo, and specimens with foliage only were distributed from the Berlin Herbarium annotated by Professor Urban as related to *M. spathulata* Griseb., a Cuban species.

M. spathulata is, however, a species with distinctly pinnately-veined leaves, and, as shown by Linden's no. 2147, is clearly different from the Porto Rico plant under consideration, which apparently finds its nearest known relative in *M. lanceolata* Griseb., also Cuban. The new species may be characterized as follows:

Mouriria Helleri.—A spreading shrub, 2–3 m. high, the slender branches light gray. Leaves oblong to oval, thick, bluish green, strongly 1-nerved, the few lateral veins very indistinct, obtuse at the apex, narrowed at the base, 2–3 cm. long, 1–1.7 cm. wide, the margins somewhat revolute; petioles about 1 mm. long: flowers solitary in the upper axils, few; pedicels 5–6 mm. long, 2-bracteolate at about the middle, the bractlets 1 mm. long, ovate, acute: berries orange-color, 1 cm. in diameter or more, fleshy, the persistent cup-shaped calyx with short broad acute lobes.

In sandy soil near a mangrove swamp, Cataño (Heller, no. 1372, in fruit, May 23, 1899; type); rocky places in the forest near Hatillo (Sintenis no. 6195, Dec. 2, 1877, foliage only).

N. L. Britton.

PROCEEDINGS OF THE CLUB

Tuesday, November 12, 1901

This meeting was held at the museum, Botanical Garden, Bronx Park, at 3:30 p. m., Professor L. M. Underwood in the chair, 20 persons present.

On report of the committee on nominations, the name of Professor Charles E. Bessey was removed from the list of corresponding to that of active members.

The Club voted that beginning with January 1st, the Club meet each second Tuesday of the month at the College of Pharmacy at 8 p. m., and on each last Wednesday at 3:30 p. m. at the Botanical Garden.

The first paper was by F. S. Earle, on "*Ascocorticium* in North America," correcting the current nomenclature as to this genus.

The second paper, by Dr. Britton, " Remarks on the Flora of St. Kitts, British West Indies," was a sketch of his recent observations there, with a copious series of mounted specimens and of fruits and other specimens in formalin. Scarcely any botanical work had been done on St. Kitts previous to the explorations by Dr. Britton and Mr. John F. Cowell last summer. In all they collected about 3,500 herbarium specimens, representing perhaps half of the flora. Several tree-ferns were brought which are now making good growth, and a considerable number of cacti which are already on exhibition in the succulent house.

Dr. Britton spoke in particular of the great interest attaching to that purely tropical flora, the only plant familiar from our Atlantic coast being the introduced horseweed, *Leptilon*. St. Kitts is a volcanic mass, formed of a rugged central mountain rising to about 4,000 feet, dissected by radiating gorges which reach to the sea, and wholly surrounded by a fringe of arable land on the shore. Sides of steep ravines 300 feet deep were often completely covered with a prodigious growth of tree-ferns; there were four or five species in the ravines and one or two others more in the denser forests; some reached a height of 50 feet; one species was chiefly prostrate. A good number of the filmy ferns were found and several Gleicheniaceae at high altitudes, where ferns constituted the chief flora. No *Equiseta* were found; among the lycopods, a few specimens of *Psilotum* on tree-trunks, some large and handsome species of *Selaginella*, and three of *Lycopodium*, of which one conspicuous species was known to the negroes as "staghorn." The grasses number 30 or more, the largest a

Gynerium known as wild cane or dumb cane. Guinea-grass, *Panicum maximum*, is the entire source of hay. Sedges were few, for there is little standing water (except a littoral salt marsh), only a little pond near a mountain summit at 3,500 feet, and a little lake in the bottom of the old crater of the volcano, Mt. Misery. A *Scleria* with saw-edged leaves is an obstacle on mountain-trails.

Aroids are very conspicuous, and in great quantity, but only about 8 species; two of *Anthurium*, climbing trees, two of *Philodendron*, one with perforated leaves; one *Dieffenbachia;* and a species known as elephant's ears, forming great masses, with leaves sometimes five feet long.

Only two palms were found, one, a *Bactris*, reaching thirty feet; two species of *Commelina;* three or four species of *Tillandsia;* a *Dioscorea* with a remarkable purple leaf, now growing in the propagating house; about sixteen orchids; and one gymnosperm, a *Podocarpus* abundant high up, and known as "wild rosemary tree." Among higher plants the pepper family, the Papilionaceae and allies, *Euphorbia* and *Melastoma* families are numerous. The Compositae are also numerously present, but chiefly as weeds; a handsome new purple-flowered *Eupatorium* was found on the top of Mt. Misery forming a shrub eight to ten feet high. The alligator-pear, *Persea gratissima*, is quite abundant. There are four species of *Ficus*, a wild cherry, a *Viola*, etc. An introduced raspberry occurred in a mountain pasture at 2,000 feet. Among the more peculiar plants were the *Cecropia*, with white under surfaces of leaves, *Marcgravia* climbing appressed to trees to the height of fifty feet, and *Hillia*, interesting from its large lustrous white flowers.

The results of Dr. Britton and Mr. Cowell's expedition bid fair to prove of high economic importance aside from their scientific value. The expedition owed much to the kind assistance of the planters, who detailed their negroes and horses for the service of the explorers. Without such aid it would have been difficult to penetrate the forest-belt, through which trails had first to be cut.

Further remarks were added by Dr. Underwood, regarding a dodder in tops of trees in Porto Rico; by Mr. Barnhart, on a

Utricularia among the specimens exhibited from St. Kitts; by Mr. F. S. Earle on the few fungi collected; and by Mrs. Britton on the other cryptogams, which numbered 81, and included a *Vittaria* prothallium.

EDWARD S. BURGESS,
Secretary.

NEWS ITEMS

Professor W. J. Spillman, formerly of the Washington Agricultural Experiment Station, has been appointed Agrostologist of the U. S. Department of Agriculture to succeed Professor F. Lamson-Scribner, who has resigned to become Chief of the Insular Bureau of Agriculture in the Philippines.

The third annual meeting of the Botanists of the Central States was held at the University of Chicago, December 31, 1901, and January 1 and 2, 1902, in connection with the meeting of the American Society of Naturalists. The program, as announced, included twenty-seven botanical papers.

The seventh annual winter meeting of the Vermont Botanical Club will be held at the University of Vermont, Burlington, January 24th and 25th. The annual address is to be delivered by Professor B. L. Robinson, of Harvard University, his subject being "Some recent Advances in the Classification of the Flowering Plants." A full and interesting program is promised.

A case of "duplication of contributions" comparable with that referred to by Dr. MacDougal in TORREYA for November last is an article on "The Nomenclature of Lachnanthes," by James Britten, F.L.S., in the *Journal of Botany* for January, 1902. In this correction of current nomenclature, Mr. Britten traverses practically the ground covered by Mr. Roland M. Harper in his notes on the "Synonymy of Burmannia and Gyrotheca," published in TORREYA for March, 1901, and reaches the same results.

At the Nineteenth Congress of the American Ornithologists' Union, which met in New York City November 11–15, 1901,

Dr. J. A. Allen, Curator of the Department of Mammalogy and Ornithology of the American Museum of Natural History, read a suggestive paper on "The present Outlook for Stability in Nomenclature." He referred to the gradual acceptance of the methods of the American ornithologists by foreign ornithologists and also by American workers in other branches of the biological sciences.

Longmans, Green and Company have in press an "Elementary Plant Physiology" by Dr. MacDougal, which is intended to replace the "Experimental Plant Physiology" by the same author published by H. Holt and Company in 1895. The first-named company has purchased all the rights of the older book and destroyed the plates, and the edition is entirely exhausted. The new text will present the subject in its simplest technical aspect, and will be uniform in method of treatment with the more advanced Practical Text-Book of Plant Physiology published in 1901.

Dr. Charles Mohr's "Plant Life of Alabama" has been soon followed by "The Flora of Tennessee" written by Augustin Gattinger, M.D., and published by the State of Tennessee through its Bureau of Agriculture. This work consists of an annotated list of the Pteridophytes and Spermatophytes of Tennessee, preceded by an account of the regional distribution of the plants of the State and by a preface containing much interesting autobiographical matter, the whole being followed by the "Philosophy of Botany," a historical sketch of the development of the science from the earliest times.

From the income of the Olivia and Caroline Phelps Stokes Fund for the Protection of Native Plants, the New York Botanical Garden has offered three prizes of $50, $30 and $20, each, for the best essays upon the preservation of wild plants, including shrubs, herbs and trees. Such essays must not exceed three thousand words in length, must be clearly written or type-written in triplicate, and are to be submitted to the Director-in-Chief not later than February 1, 1902. The successful essays are to be published first in the *Journal* of the Garden, separates being

printed for gratuitous distribution to all interested. Republication of the prize essays in other journals, magazines and newspapers is to be invited.

The Society for Plant Morphology and Physiology held its fifth annual meeting at Columbia University, on December 31, 1901, and January 1, 1902. The following papers and reports were presented: Artificial changes affecting the Vegetation of the Huron River, *Professor V. M. Spalding*, University of Michigan; A floating tropical botanical Laboratory (illustrated), *Dr. John W. Harshberger*, University of Pennsylvania; The Physiology of Sea-water, *Dr. Rodney H. True*, Department of Agriculture; On the Teaching of Plant Physiology to large elementary Classes, *Professor W. F. Ganong*, Smith College; Discussion upon the most profitable Relation of the American botanical Societies to one another, opened by *Dr. D. T. MacDougal*, New York Botanical Garden; Report of the Committee on the Botanisches Centralblatt, *Professor W. G. Farlow*, Harvard University, Chairman; On the Teaching of Vegetable Pathology, *Dr. Hermann von Schrenk*, Shaw School of Botany; A Disease of the American Ash, *Dr. Hermann von Schrenk;* The Destruction of Cell Walls by Bacteria, *Dr. Erwin F. Smith.*, Department of Agriculture; Observations on the Bacterial Rot of the Calla Lily, *Dr. C. O. Townsend*, Department of Agriculture; Germination of Basidiomycetous Spores, *Dr. Margaret C. Ferguson*, Wellesley College; Vegetative Reproduction in Leptolejeunea, *Professor A. W. Evans*, Yale University; Observations on Pterygophora, *Professor Conway MacMillan*, University of Minnesota; Notes on new species of Lichens collected by the Harriman Expedition, *Professor Clara E. Cummings*, Wellesley College; What is the Archesporium? *Professor F. E. Lloyd*, Columbia University; The Embryology and Germination of the Genus Peperomia, *Professor Duncan S. Johnson*, Johns Hopkins University; Report of the Committee on the Standard College Entrance Option in Botany, *Professor W. F. Ganong*, Smith College, Chairman. For the afternoon of January 1, the Society adjourned to the New York Botanical Garden where the museums, laboratories, and conservatories were inspected. The sessions were brought to a close with a dinner,

at which the retiring President, Dr. Erwin F. Smith, delivered the presidential address upon "Plant Pathology: A Retrospect and Prospect." For the ensuing year, Professor V. M. Spalding was elected President; Professor Byron D. Halsted, Vice-President; and Professor W. F. Ganong, Secretary-Treasurer.

The Society's committee on securing better reviews of botanical literature reported upon the organization of the Association Internationale des Botanistes and the purchase of the Botanisches Centralblatt by this Association. The Centralblatt, under the new management, is published by the firm of E. J. Brill, in Leyden, with Dr. J. P. Lotsy as acting editor-in-chief. The American representatives upon the editorial staff, with their respective departments, are as follows:

Phanerogams (systematic) and Chairman of the American Board, Professor William Trelease, Missouri Botanical Garden, St. Louis.

Morphology, Professor D. H. Campbell, Leland Stanford Junior University, California.

Cytology, Dr. C. J. Chamberlain, University of Chicago.

Physiology, Professor D. T. MacDougal, New York Botanical Garden, Bronx Park, New York City.

Algae, Dr. G. T. Moore, U. S. Department of Agriculture, Washington, D. C.

Paleontology, Professor D. P. Penhallow, McGill University, Montreal.

Fungi, and Secretary of the American Board, Dr. Hermann von Schrenk, Shaw School of Botany, St. Louis.

In order to facilitate the work of the editors, it is urged that authors send copies of their papers as soon as published to the editor in charge of the department concerned. The annual fee for membership in the Association is twenty-five shillings, all members receiving the Centralblatt *gratis*. The subscription price of the Centralblatt to non-members is twenty-eight shillings. Reviews are to be published in English, French or German. The first number of the Centralblatt issued by the new board of editors bears the date of January 3.

Vol. 2 No. 2

TORREYA

February, 1902

ON THE BEHAVIOR OF MUTILATED SEEDLINGS*

By Byron D. Halsted

The particular form of mutilation of seedlings here considered is that of the removal of the plumule. Several kinds of plants have been treated in this way during the past twelve months. The first of these was the garden radish, representing a small, large-rooted and short-lived plant. Soon after the seedling was above ground the plumule was removed upon alternate rows of plants, while the other rows were left to grow normally. The first thing to observe was the much deeper green of the cotyledons of the de-plumuled plants. This was followed by a remarkable elongation of the petiole and increase in size of the obcordate blade, the former attaining a length of three inches and the latter a breadth of an inch and a half. These cotyledons were raised at an angle of about 45° and the very dark green blade had a thickness nearly double that of the normal cotyledons. A microscopic examination showed that the greater thickness was due to increased size of the cells instead of to a multiplication of the layers. The chlorophyll was excessive and the amount of starch so great as practically to render them black when blanched with alcohol and iodized. The roots grew to nearly market size and had the tests been made with a turnip-shaped sort instead of a long variety, it is very likely that the roots would have been fit for the table.

The second species was the common morning glory [*Ipomoea purpurea* (L.)]. Here the cotyledons are large in the seedling,

* Abstract of a paper, with several photographs, prepared for the fifth meeting of the Society for Plant Morphology and Physiology at Columbia University, Jan. 1, 1902.

[The exact date of publication of each issue of Torreya is given in the succeeding number. Vol. 2, No. 1, comprising pages 1–16, was issued January 24, 1902.]

but quickly are lost from sight by the development of the much larger alternate true leaves. After holding on for a few days as a rule, the cotyledons lose their green color and drop from the stem. In the de-plumuled seedlings the petioles at once begin to elongate as was shown to be true with the radish, while the remarkable green develops in the blades that likewise become double, or more, the normal size and are the organs of photosynthesis for the mutilated plant. Their dark green is shared by the long, arched petioles (quite different in this respect from those of the radish) and the hypocotyl. The latter becomes of twice the sectional area of that of the normal plants, which are now several feet high and bearing flowers, and becomes a storehouse for the starch that is robbed of its proper use by the absence of any stem. The root system of the de-plumuled plant is not different from that of the normal specimens.

A third type of plant put to the test was the Hubbard squash, the seedlings of which naturally have large cotyledons. In these the seed-leaves remain near the soil without any apparent elongation of the hypocotyl, but there is a remarkable increase in the size of the cotyledons until they are sometimes four or more inches in length and very odd, to say the least. Normally, the true leaves come forth from the plumule rapidly and owing to their large size the cotyledons are soon out of sight and quickly wither away. Dwarfed squash plants depending entirely upon the cotyledons have been kept in apparently healthy condition for four months, the size remaining practically the same after the first four weeks. These plants, unlike those previously mentioned, need frequent attention, for buds will develop in the axils of the seed leaves, which when removed will be followed by others without any determined number. If left undisturbed a whole thick cluster of stems and small leaves will develop.

The egg-plant, as representing a slow-growing type of bushy plant, was employed for the test in question and it was found that this behaved in a manner similar to the radish, in that the petioles of the cotyledons became rigid and nearly upright, and bore the thick, almost fleshy, much enlarged oblanceolate blades well up in the air and sunshine. In this form the de-plumuled plants

will stand still in a very liberal sense of that term for an indefinite time, not weeks, but long months.

The last type of plant to be considered is represented here by the common sunflower (*Helianthus annuus* L.). As with the other types, the plants in alternate rows were de-plumuled. The first change was quickly observed, namely, the enlargement of the cotyledons; but here the most noticeable thing observed was the elongation of the hypocotyl, which finally reached fully nine inches or double that of the normal plants. There is a greater tendency for hypocotyledonary growth in the sunflower than in any other of the types named, and this was remarkably accentuated in the mutilated plant. The structure of this stem, even at the end of three months, retained generally the primitive structure it possessed as a young seedling, that is, for example, the wood zone was made of a series of stout bundles, evenly disposed without the filling in and completion of the thick ring of xylem so well demonstrated in the normal plant at the same age.

The experiments illustrate how an organ normally designed to store food for the developing seedling may persist in case of an emergency and take on a greatly increased size for that purpose. The petiole may assume a direction in connection to its enlargement that will aid the blade in its work of photosynthesis. Along with these changes in the seed-leaves there may be others in surrounding parts, particularly the hypocotyl when it becomes thickened remarkably and green as in the morning glory and greatly elongated but slender as in the sunflower. In case of the radish a place for any surplus growth is provided for in the root, naturally destined to be fleshy and the hypocotyl is not modified.

Perhaps the greatest surprise is the length of time a plant will hold out when it is deprived of the means for making a successful struggle for life and of all possibility of reproduction.

RUTGERS COLLEGE, NEW BRUNSWICK, N. J.

OBSERVATIONS ON LYCOPODIUM

By Francis E. Lloyd

In the summer of 1901, during a visit to Europe, I had the opportunity to observe several species of *Lycopodium* as they grow in parts of the Old World.

Lycopodium complanatum L.—A lot of sterile material of this plant was collected by Dr. Dunzinger of the Botanical Institute, University of München, in the Isarthal near München, on July 25, 1901, and was put at my disposal. Examination showed that the rhizome was blanched as a result of its growth in the mossy mats which clothe the ground in its habitat. The further fact of interest was noted that in this region *Lycopodium complanatum* innovates annually as *L. tristachyum* Pursh is known to do in North America. This behavior is probably a response to the much moister climate of Bavaria. *L. tristachyum* is apparently not to be found in the same locality. I have, however, seen material found growing in the vicinity of Bonn, answering to the North American *L. tristachyum* in every particular.

Lycopodium alpinum L.—This plant was found fairly abundant in the Austrian Tyrol on the flanks of the mountains at the Brenner Pass, and on the mountains behind Steinbach, which stands in the region in which Anton Kerner von Marilaun made his studies of the alpine vegetation. The time—July—was too early for the strobiles to have reached full development. The densely crowded tufts of foliage are often so tightly woven in with the neighboring plants, forming with them the dense carpet of the "alpine pastures," that it is at first quite difficult to recognize.

The striking fact about this plant is that a remarkable amount of dorsiventrality is developed in the branchlets, in spite of their generally vertical position. I have made the statement elsewhere * that this plant is the most strongly dorsiventral of all the plants in the group to which it belongs. Goebel,† however, takes the position that *L. complanatum* has that distinction.

* Lloyd, F. E., and Underwood, L. M. Bull. Torrey Club, 27: 147. 1900.

† Organography (translation), 105.

Regarding the much flattened stem and suppression of the under leaves as indicating the amount of dorsiventrality, it would appear that Professor Goebel is quite right. It was, however, not in this sense that I used the expression, for I referred rather to the remarkable amount of difference in the form of the leaves which are indeed trimorphic, a matter which has been sufficiently elucidated in the paper above alluded to. It would seem, therefore, that *Lycopodium alpinum* occupies a peculiar position, and may more properly be regarded as a parallel species with *L. complanatum.* The two species represent two different kinds of specialization and the peculiar features of the plant *L. alpinum* may perhaps be due to an attempt to revert to a radially symmetrical condition, a suggestion prompted by the fact of the orthotropous position of the branchlets above referred to.

Lycopodium Selago L.—The brood bodies or gemmae of *Lycopodium lucidulum* Michx. are produced on curiously modified branches, which do not, as many suppose, develop in the axils of leaves. It is not very widely known that some, the proximal, leaves of these peculiar branches are so modified as to form a mechanical apparatus for the expulsion of the distal part of the shoot, which constitutes the brood body.

I have been fortunate in extending this observation to *Lycopodium Selago,* which was found growing in the alpine regions of the mountains in the vicinity of Brenner. Observation shows that a very light touch is sufficient to release the mechanism which acts as a pinching catapult, if we may so call it, and may be compared to the somewhat similar mechanical condition seen in the dehiscent fruits in *Viola* and *Hamamelis.* The gemmae are cast to a distance of several centimeters, sometimes ten or more.

Undoubtedly the same will be shown to occur in *Lycopodium porophilum* Lloyd & Underwood.

TEACHERS COLLEGE, COLUMBIA UNIVERSITY.

A KEY TO THE NORTH AMERICAN SPECIES OF HYPHOLOMA

By F. S. Earle

Key to the Sections

1.	Pileus glabrous.	2.
	Pileus more or less silky or floccose.	3.
2.	Pileus dry, often areolate with age.	Sec. Fascicularia.
	Pileus viscid, not hygrophanous.	Sec. Viscida.
	Pileus hygrophanous, changing color on drying.	Sec. Appendicularia.
3.	Pileus silky with innate fibrils.	Sec. Velutina.
	Pileus floccose with separable scales.	Sec. Flocculosa.

Section Fascicularia

1.	Pileus some shade of gray, rimose.	*H. cutifractum* Pk.
	Pileus some shade of yellow or brown.	2.
2.	Flesh white or whitish.	3.
	Flesh bright yellow.	4.
3.	Flesh bitter, lamellae at first whitish.	*H. sublateritium* (Schaeff.) Sacc.
	Flesh mild, lamellae at first pale yellow.	*H. perplexum* Pk.
	Flesh mild, lamellae at first smoky blue.	*H. capnoides* (Fr.) Sacc.
4.	Pileus papillate-umbonate.	*H. papillatum* Pat.
	Pileus obtuse or subumbonate.	5.
5.	Pileus dark yellowish-brown, lamellae at first sulphur-yellow then greenish.	*H. fasciculare* (Huds.) Sacc.
	Pileus light yellowish-brown, lamellae at first greenish then olivaceous.	*H. elaeodes* (Fr.) Sacc.

Section Viscida

1.	Pileus tawny, radiately wrinkled.	*H. rugocephalum* Atk.
	Pileus straw-yellow to pale orange, smooth.	*H. ambiguum* Pk.

Section Appendicularia

1.	Lamellae at first purplish or violet.	10.
	Lamellae not at first purplish or violet.	2.
2.	Small, pileus 1 cm. or less.	3.
	Larger, pileus more than 1 cm.	4.
3.	Stipe with an abruptly enlarged disc at base.	*H. phyllogenum* Pk.
	Stipe equal, base not enlarged, blackening on drying.	*H. modestum* Pk.
4.	Pileus light-colored, white, pallid, alutaceous, etc.	5.
	Pileus darker, brown or yellowish-brown, at least when moist.	6.
5.	Pileus hemispheric, apex of stipe substriate.	*H. saccharinophilum* Pk.
	Pileus campanulate to expanded, apex of stipe subfurfuraceous.	*H. incertum* Pk.

6. Pileus lighter on drying. — 7.
Pileus darker on drying. — *H. longipes* Pk.

7. Lamellae at first whitish. — 8.
Lamellae at first brownish. — 9.

8. Stipe white, hollow, pileus disc rugose. — *H. madeodiscum* Pk.
Stipe white, hollow, pileus smooth. — *H. appendiculatum* (Bull.) Sacc.
Stipe reddish, stuffed. — *H. squalidum* Pk.

9. Stipe less than 8 cm., pallid, fibrillose. — *H. atrifolium* Pk.
Stipe 8 cm. or more, white, striate. — *H. hymenocephalum* Pk.
Stipe 8 cm. or more, sordid white with brown stains, uneven, nodulose-verrucose. — *H. Californicum* Earle.

10. Small, pileus 1–2 cm. — *H. olivaesporum* Ell. & Ev.
Large, pileus 5–11 cm. — *H. Candolleanum* (Fr.) Sacc.

Section VELUTINA

1. Pileus small, 1–3 cm. — 2.
Pileus larger, 5 cm. or more. — 3.

2. Pileus grayish with black fibrils, lamellae at first white. — *H. aggregatum* Pk.
Pileus brown, lamellae at first purplish. — *H. comaropis* (Mont.) Sacc.

3. Pileus white or yellowish, indistinctly fibrillate, stipe smooth, shining. — *H. nitidipes* Pk.
Pileus white then brown, with dark innate scales, stipe squamulose. — *H. lacrimabundum* (Fr.) Sacc.

Section FLOCCULOSA

1. Pileus grayish-brown. — *H. hirto-squamulosum* Pk.

In attempting to use the above key it must be borne in mind that it is constructed largely from published descriptions and that these descriptions are often faulty or insufficient, hence the key is necessarily purely artificial and does not attempt to indicate the relationship of the species except as to the division of the genus into sections. Further, it should be remembered that the fleshy fungi of only a very small part of the vast territory of North America have been studied with any degree of thoroughness, so that in all probability many forms remain to be discovered that cannot be referred to any of the above species. With these considerations in mind it is believed that such keys will be found useful by those who are interested in these plants.

NEW YORK BOTANICAL GARDEN.

A NEW VIOLET FROM NEW JERSEY*

BY CHARLES LOUIS POLLARD

Viola Angellae sp. nov.

Plant acaulescent, about 1 dm. high at flowering time, from a stout ascending or erect branching rootstock: young leaves sparsely pubescent, especially along the veins and on the petioles, cordate-ovate in outline, with a broad sinus, irregularly 5–7-lobed or some of them merely deeply sinuate; lobes all obtuse, more or less crenate: scapes somewhat exceeding the foliage: flowers violet-purple, darker at base: sepals oblong, very obtuse, 5 mm. long: petals oblong, rounded and entire at apex, 1–2 cm. long, nearly equal: aestival leaves with petioles 2–2.5 dm. long, greatly surpassing the persistent vernal foliage; the latter leaves more constantly 3-lobed, the lobes irregularly crenate-dentate: cleistogamous flowers few, borne on short, deflexed scapes: capsule oblong.

Types in the U. S. National Herbarium, no. 364,862 (for flowers) collected by Miss Lillie Angell at Orange, New Jersey, in May, 1900; also no. 352,093 (aestival leaves), same locality and collector, June, 1899.

Living plants of this species were sent to me by Miss Angell in 1899, then past the flowering season. The unusual feature of vernal and aestival foliage being present on the same plant attracted my notice, and I asked for additional material, which was afterward placed in my garden. In the spring of 1900 Miss Angell furnished flowering specimens, which I had an opportunity of comparing with those already in flower in the garden, and which proved to have held their characters perfectly. During the season of 1901 the plants have continued to thrive, and show no tendency to approach *V. palmata*, the most nearly related species. They have been grown in close proximity to *Viola palmata*, *V. Brittoniana*, *V. falcata* and *V. viarum*. At the commencement of flowering the species is less distinctive in appearance, although the very earliest leaves show some degree of lobation, which is hardly the case with those of *V. palmata*. The

* Published by permission of the Secretary of the Smithsonian Institution.

flower is quite different in color, and there is much less pubescence on the foliage. These early leaves, as in most violets, are borne on very short petioles, giving the plant a tufted appearance, and causing the flowers to stand out prominently. When the new leaves develop they speedily attain large dimensions, completely overtopping the vernal leaves and the few remaining flowers, so that the plant is really a remarkable sight throughout the greater part of the summer, with two distinct masses of foliage. The cleistogamous flowers are not produced, in cultivation at least, in the same abundance as those of *V. palmata*, so that my plants have not spread to any extent beyond the spot in which they were originally set out.

I wish to express my obligation to Miss Angell for the courtesies she has shown in furnishing notes and material, and to her is due the chief credit of its recognition as a distinct species. It grows in great abundance in tracts of open woodland in the Orange mountains, being associated with *V. palmata* there.

UNITED STATES NATIONAL MUSEUM.

SHORTER NOTES

ANIMAL MYCOPHAGISTS.—I noticed last summer a large sphingid larva feeding with evident relish upon a plant of *Polyporus flavo-virens* in the woods near Blacksburg, Virginia. It is a matter of common observation that flies, snails, chipmunks and various other animals that inhabit the woods are fond of mushrooms, but it was rather surprising to find a green tomato-worm eating a yellowish-brown and rather tough fungus. Dr. Charles H. Peck in his forty-third report speaks of seeing large tufts of *Armillaria mellea* in the Adirondacks without pilei, which, he thinks, were eaten by deer. It is well known that mushrooms are sometimes eaten by cows, particularly in late summer when the pastures become dry. An interesting case of mycophagy was recently brought to my attention by Mr. M. W. Gorman, of Portland, Oregon, who has botanized considerably in Alaska. He says that in the region west of the Yukon River the small red, or "pine," squirrel lives during the winter upon

the seeds of *Picea alba* and mushrooms. The latter are collected in large quantities during the summer and placed in the forks of branches and other secure spots above the ground to dry. Three different kinds of brownish-colored agarics were noticed by Mr. Gorman. The squirrels, he says, visit their collections every day, even in the coldest weather.

W. A. MURRILL.

PROCEEDINGS OF THE CLUB

WEDNESDAY, NOVEMBER 27, 1901

The meeting of November 27 was held at the College of Pharmacy at 8 P. M., President Brown in the chair and twenty persons present.

The treasurer reported the names of members delinquent in payment of dues during three years past, and it was voted that he be directed to notify members more than two years in arrears that their names would be dropped from the roll in accordance with the provisions of the Constitution unless payment be made before the next annual meeting.

The scientific program consisted of the announced paper by Dr. W. A. Murrill on "The new International Botanical Association." The speaker gave an illustrated account of the meetings held in Geneva in August and described the organization and aims of the *Association internationale des Botanistes.*

TUESDAY, DECEMBER 10, 1901

The meeting was held at the Museum of the New York Botanical Garden, with Vice-President Rusby in the chair. Seventeen persons were present.

Miss Nellie Hewins, Maspeth, L. I., and Miss Rosina J. Rennert, 98 East 114th Street, New York City, were elected to membership.

The first paper on the scientific program was by Professor L. M. Underwood on "The Genus *Gleichenia.*" This was illustrated by specimens and sketches, showing the principal natural types. The paper will be published in full in an early number of the *Bulletin.*

Mrs. N. L. Britton presented "Notes on Macoun's recent Collection of Canadian Mosses," speaking of collections made by Professor J. Macoun during the past summer in the lower peninsula of Ontario between Lake Erie and Lake Ontario. Special mention was made of *Seligeria campylopoda* Kindb. previously known only from Owen Sound, but now collected at Niagara Falls. This moss ordinarily grows in pockets in limestone rocks and, being very small, is easily overlooked. Mrs. Britton alluded also to the synonymy of *Polytrichum Ohioense* Ren. & Card. This species was distributed by Drummond in his Musci Americani as *Polytrichum pallidisetum* and is apparently the same as what was afterwards recognized in the Manual of Lesquereux and James as *Polytrichum formosum*, var. *pallidisetum*, but whether the original *Polytrichum pallidisetum* of Funck is identical remains to be determined.

Dr. P. A. Rydberg in "A Review of a recent Monograph of the Ranunculaceae" discussed the work recently published by Dr. K. C. Davis.

The final paper was by Mr. S. H. Burnham and was entitled "Notes on the Flora of the Lake George Region." Mr. Burnham referred especially to *Bidens Beckii*, an aquatic plant growing in five or six feet of water in muddy streams, and to his experiences in collecting it through the ice during the last week of November of the present year. He also alluded to the restriction of *Castalia tuberosa* to the streams flowing directly into Lake Champlain while *Castalia odorata* alone is found in the Lake George basin.

MARSHALL A. HOWE,
Secretary pro tem.

ANNUAL MEETING, JANUARY 14, 1902

This meeting was held at 8 P. M. Jan. 14th, at the College of Pharmacy; Judge Brown in the chair, seventeen persons present.

The following were elected to active membership: Mr. I. C. Buchheister, 28 Pine Street, N. Y.; Mr. Stewart H. Burnham, N. Y. Botanical Garden; Dr. Henry Kraemer, Philadelphia College of Pharmacy, Philadelphia, Pa.

The committee on clerical aid reported as follows:

' Your committee appointed to consider the relief of the business pressure on the secretary, treasurer and editor owing to the increase in the business of the Club would recommend, (1) That the treasurer as the financial head of the Club should be responsible for all the financial administration of the Club, including the care of the subscription list and the sale of all the publications; (2) That he should prepare and keep the official list of members, thus relieving the secretary and editor of all responsibility in this line, and (3) That the Club should allow him an amount not exceeding one hundred and fifty dollars per annum to be used for clerical work connected with the keeping of the books of the Club and the sale of the publications.

This will necessitate the centralization of the Club's business at a single center."

Respectfully submitted,

L. M. UNDERWOOD,
D. T. MACDOUGAL,
F. E. LLOYD,
Committee.

The above report was adopted, on motion of Dr. Rusby, seconded by Dr. Britton.

The committee on reporting proceedings recommended that the proceedings be published in TORREYA instead of the *Bulletin*, beginning with January, 1902.

The secretary, Professor Burgess, presented and exhibited the bound volume of minutes for 1901, and reported 15 meetings held with an attendance varying from 10 to 30, the average 20; 28 active members elected, 12 resigned; total present membership 383, including 3 honorary, 142 corresponding, 238 active.

The editor, Professor Underwood, reported issue of the largest volume of the *Bulletin* in its history, 706 pages and 48 plates. The monthly index of recent literature has been reprinted as usual in card form and includes 983 titles for 1901, an increase of 127. Vol. 10 of the *Memoirs*, including the first part of Professor Burgess' "Aster Studies" is nearly through the press. No. 1 of Vol. 11, Dr. Griffiths' memoir on the North Ameri-

can Sordariaceae, has been printed. The principle adopted with the issue of Vol. 7 to make the memoirs pay for their own publication has been eminently successful. An increased sale of recent volumes and of sets was reported. The following forthcoming publications were announced: in Vol. 8, the conclusion of Professor Lloyd's studies on the embryology of the *Rubiaceae;* by Dr. A. W. Evans, "A Monograph of the *Lejeuneae* of the United States and Canada"; by Mrs. E. G. Britton and Miss Alexandrina Taylor, "The Life History of *Vittaria lineata"*; in Vol. 11, "The *Ulotrichaceae* and *Chaetophoraceae* of the United States," by Dr. T. E. Hazen; Vol. 12, the second part of Professor Burgess' "Aster Studies."

Upon the acceptance of this report, the thanks of the Club were voted to the editor, Dr. Underwood, upon motion of Dr. Chamberlain, who expressed his profound feeling of indebtedness to the editorial board, and especially to the editor-in-chief, and his appreciation of the great labor involved, done without pecuniary compensation.

In response to call for reports on library and herbarium, Dr. Underwood remarked that we receive a large number of periodicals in exchange, all of which go to the library of the Botanical Garden, and are accessible to members; and Dr. Small remarked that the herbarium is now installed in its separate cases at the Botanical Garden, there to form the nucleus of a local flora of the 100-mile limit.

Dr. Britton reported as follows, regarding the local flora: Mr. Bicknell is continuing his observations on the flora of the region north of the Harlem and south of Yonkers. It is extremely desirable that some one take up the preparation of a diagnostic list of the metropolitan flora. Material for it exists already at the Botanical Garden, and in the collections of the Brooklyn Institute, the Staten Island Natural History Society, and the Geological Survey of New Jersey. It would be a work of great popular utility.

Regarding work on the cryptogamic flora, Professor Underwood reported that the immediate vicinity of New York had recently furnished the chief material for Dr. Griffiths' work on the

Sordariaceae, and for Dr. Hazen's work on the fresh water algae of the *Ulotrichaceae* and *Chaetophoraceae*. Special collections have been made of the Musci of Bronx Park and vicinity by Mrs. Britton, and of the fungi by Dr. Underwood and Professor Earle.

The field committee, through its chairman, Dr. L. Schoeney, reported the success of the plan of printing a single field program in advance for the whole season; and in view of the difficulty of obtaining guides, made grateful acknowledgment of the aid given by the staff of the New York Botanical Garden.

The annual election followed. Dr. Britton remarked that under the new duties now to be required of the treasurer, it would be impracticable for Dr. Ferguson to continue to act, and it is important that the treasurer should be one who is convenient of access to the editor. On motion of Dr. Britton, seconded by Dr. Underwood, the Club expressed its grateful acknowledgments to the treasurer for his fidelity and diligence in discharge of the duties of his office.

The following board of officers was then elected: *President*, Hon. Addison Brown; *Vice-Presidents*, Dr. T. F. Allen, Dr. H. H. Rusby; *Treasurer*, Professor F. E. Lloyd; *Recording Secretary*, Professor E. S. Burgess; *Corresponding Secretary*, Dr. J. K. Small; *Editor*, Professor L. M. Underwood; *Associate Editors*, Dr. N. L. Britton, Dr. C. C. Curtis, Dr. Marshall A. Howe, Professor F. E. Lloyd, Dr. D. T. MacDougal, Dr. H. M. Richards, Miss Anna Murray Vail.

President Brown then announced the following appointments for standing committees for 1902: *Committee on Finance*, Dr. H. H. Rusby, Mr. J. I. Kane, Mr. C. F. Cox; *Committee on Admissions*, Cornelius Van Brunt, 319 E. 57th Street, Delia W. Marble, Bedford, N. Y., Dr. J. K. Small, Botanical Garden; *Committee on Local Flora*, Professor N. L. Britton; Phanerogamia—Eugene P. Bicknell, H. H. Rusby, M.D., Fanny A. Mulford; Cryptogamia—Professor L. M. Underwood, Marshall A. Howe, Mrs. Elizabeth G. Britton; *Committee on Excursions*, Dr. L. Schoeney, 23 W. 135th Street, Geo. V. Nash, Miss Marie L. Sanial, Eugene Smith, Miss L. K. Lawall; *Committee on Program*, Dr. N. L. Britton, Dr. M. A. Howe, Dr. L. M. Underwood.

NEWS ITEMS

A valuable bulletin on "Range Improvements in Arizona," by Dr. David Griffiths, expert in charge of field management, has recently been published by the Bureau of Plant Industry of the U. S. Department of Agriculture.

An interesting paper by Mr. V. K. Chesnut, on "Plants used by the Indians of Mendocino County, California," has been issued as No. 3 of Vol. 7 of the Contributions from the U. S. National Herbarium.

Dr. D. T. MacDougal left New York on January 31, to spend a month or more in Arizona and northern Mexico. He plans to bring back living cacti, yuccas, agaves and other xerophytes for the New York Botanical Garden.

The Southern California Academy of Sciences has begun the publication of a monthly *Bulletin* under the editorship of Dr. Anstruther Davidson. The first two numbers include descriptions and figures of a new *Zauschneria* and of a new *Aster.*

Mr. K. Fujii, of the Imperial University of Tokyo, recently visited Columbia University and the New York Botanical Garden. Mr. Fujii was on his way to the German universities, where he expects to devote three years to botanical studies.

Through a blunder of the printers, something that was used for the second title page of Volume I. of TORREYA was printed on the second page of the cover of our January issue in place of the revised list of officers and our customary editorial statement.

Dr. Edward Palmer, the veteran explorer of Mexico, left Washington January 15, for a collecting expedition in the province of Santiago, Cuba. He will obtain the usual number of sets, which will be offered for sale upon his return. Dr. Palmer will be accompanied by Mr. Charles Louis Pollard and Mr. William Palmer, both of the United States National Museum, who will collect plants, mammals, birds and reptiles for that institution. As the party will pay especial attention to the unexplored mountains in the southern portion of the province, it is expected that the scientific results will be considerable.

The seventh annual meeting of the Vermont Botanical Club

was held at the University of Vermont, Burlington, January 24 and 25. Fully fifty botanists were in attendance, and the membership of the club was increased by the addition of fifteen names. Twenty-three papers covering a wide range of taxonomic, morphological, physiological, and economic subjects were presented. Papers by Messrs. A. L. Andrews, A. J. Grout, and T. E. Hazen added thirteen species of mosses and seven species of algae to the known flora of the state. Interesting results in the cultivation of native flowering plants and ferns were discussed by Miss Smith and Mrs. Horton, and the latter reported finding *Dryopteris simulata* Dav. at Brattleboro—the first record for Vermont. The persistent efforts of Mrs. Flynn, of Burlington, have added materially to the local flora, and, chiefly through the activity of President Brainerd, W. W. Eggleston and W. H. Blanchard, sixty-four species new to the state have been reported since the publication of the revised Flora a little more than a year ago. President Brainerd suggested as the most important problems for the next season the detailed field study of the critical genera, *Crataegus*, *Rubus* and *Viola*. Progress on the maple sap problems, and the subjects of forestry and nature study, and bacterial diseases of plants were treated in several papers. In response to the annual roll call many interesting notes were given. The address by Professor B. L. Robinson, of Harvard University, on "Some Recent Advances in the Classification of the Flowering Plants" was listened to with the greatest interest. Following an introduction outlining the history of taxonomic systems, a lucid exposition of the Eichlerian principles as developed by Engler and Prantl was given, and a brief comment on the new system of van Tieghem was added. The officers of the Club were reëlected as follows: President Ezra Brainerd, of Middlebury College, president; Mr. C. G. Pringle, vice-president; Professor L. R. Jones, secretary. The field meeting of the club next summer will probably take the form of an excursion to the islands and shores of Lake Champlain.—[T. E. H.]

Vol. 2 No. 3

TORREYA

March, 1902

ADDITIONAL NOTES ON LIRIODENDRON LEAVES

By Edward W. Berry

(With Plates 1 and 2)

Any attempt at tracing the phylogeny of a species or group is always largely theoretical. The data upon which such speculations are based are always insufficient, especially when dealing with but one set of organs such as leaves. The extinct forms, generally the most essential for the correct understanding of the existing, are unknown for the most part and are represented by but here and there a fragment. At the same time phylogenetical hypotheses serve a coördinating purpose and are usually fertile with suggestions for further research.

The existing species of *Liriodendron* has never been adequately studied; especially is this true with regard to leaf-form, although the leaves furnish the only basis for comparison with the numerous fossil species. The response of organs such as leaves to their environment is generally rapid and we may be sure that similar changes in form may have appeared independently at any time when the proper environment was furnished; witness the interrelations of the variously denominated lobed leaves of the American Cretaceous. Thus it might seem that leaves afford little support for arguments as to ancestry or identity; and while this may be true when views are based on individual specimens or single "sports" it is not so far-reaching when arguments are supported by innumerable specimens, or series of specimens of a single species or genus showing constant gradations.

In a forthcoming article in the *Botanical Gazette* I have attempted a brief sketch of the probable relations of the various

[The exact date of publication of each issue of Torreya is given in the succeeding number. Vol. 2, No. 2, comprising pages 17–32, was issued February 21, 1902.]

species of *Liriodendron* and I will not attempt anything further in that line at this time, but will confine myself in these notes to calling attention to several interesting forms of these leaves and briefly discussing the evidence they offer as to the probable relations of some of the ancient members of this genus.

While *Liriodendron Tulipifera* has long been known to have variable leaves the extent of this variability has not been dreamed of, nor any reason assigned which would account for it. Darwin's law that wide-ranging species are variable is fully carried out, but, on the other hand, Sedgwick's rule that old species have lost their variability is not fulfilled. In fact, quite the reverse holds good, *Liriodendron* having reached quite a respectable old age and still retaining its variability with all the vigor of its Cretaceous days.

The accompanying plates picture some especially interesting leaves, all one-fourth natural size, from a collection of several hundred. One of the most curious is the sport shown at Fig. 7. The left half of the blade is somewhat normal in shape but the right half is reduced to a narrow lanceolate strip, which in venation bears a striking resemblance to an ordinary cotyledon. We have reconstructed this leaf, Fig. 6, as if both halves of the blade were narrowed as is the right half; this gives us a leaf strikingly like what we consider the primitive *Liriodendron* of the early Cretaceous or Jura-Cretaceous to have been. For comparison we show an ordinary cotyledon at Fig. 8, which, as will be seen, is very similar to Fig. 6.

The original *Liriodendron* leaf was long and narrow and as time passed there was a progressive widening of the blade and a corresponding reduction of the apex. It has been suggested that the mucronate point which usually tips the midrib of the modern leaf is a surviving rudiment of this once pointed apex. However this may be, we often find leaves with the acute ancestral apex (Figs. 4, 11, 12, 13, 14, 15). While the leaves bearing the tips shown at Fig. 11 were otherwise normally shaped leaves of large size, and while the leaves shown at Figs. 14, 15 were otherwise normal, the remaining acute-tipped leaves are very suggestive. The leaf shown at Fig. 4 is almost identical with the

Cretaceous species *Liriodendron semialatum* Lesq.* and while Fig. 13 at first sight suggests *Aralia*, *Cissites* or some other but little understood fossil leaf, it would be the logical successor of the *semialatum* form, being a more robust leaf with a shortened length and an increased breadth. It is however a remarkable leaf to have been borne on a tulip-tree and was sent to me from Columbus, Ohio by Mrs. W. A. Kellerman, an amateur botanist of that place.

It has become more and more evident to paleobotanists that many of the numerous leaves variously referred to *Credneria*, *Cissites*, *Araliopsis*, *Greviopsis*, *Sassafras*, *Platanus*, etc., are, at least some of them, unnaturally identified and their true affinities but little understood; and while perhaps all of these and other genera are badly in need of revision, it would be rash to attempt one without far more material than is at present available. In this connection several of our leaf specimens of *Liriodendon Tulipifera* are particularly interesting; at the same time I do not feel justified in anything further than calling attention to them. The first, Fig. 12, shows a very anomalous leaf, one which almost exactly corresponds with the *Cissites acuminatus* of Lesquereux.† It stands alone in its uniqueness, and yet the tree which furnished it bore many leaves of a similar general shape and with similar venation; they were of all sizes, some of the specimens being 130 mm. in length, and all were like the specimen in question except that the acute apex was cuneate or with a wide obtuse sinus, the resulting apical portions of the blade showing a slight tendency to become lobed.

Another specimen which is of interest in this connection is Fig. 16, on which I will offer no comment other than to call attention to its resemblance to *Cissites obtusilobus* Lesq.‡ From this leaf I have a complete series showing a gradual shortening of the midrib and a gradual lengthening of the lateral lobes, ending in the curious form shown at Fig. 18 in which the leaf consists of a single orbicular lobe on each side, the blade being nearly four times as wide as the midrib is long. Fig. 10 shows a leaf which,

* Fl. Dak. Gr. 204. *pl. 25, f. 2–4; pl. 29, f 3*. (1891) 1892.

† Compare with fig. 3 on pl. 5, Cret. & Tert. Fl. 1883.

‡ Compare with fig. 5 on pl. 33, Fl. of Dak. Group. (1891) 1892.

if the lobes were altered as indicated by the dotted lines, would greatly resemble *Liriodendron giganteum* Lesq., particularly its variety *cruciforme*, in form, venation, and size.

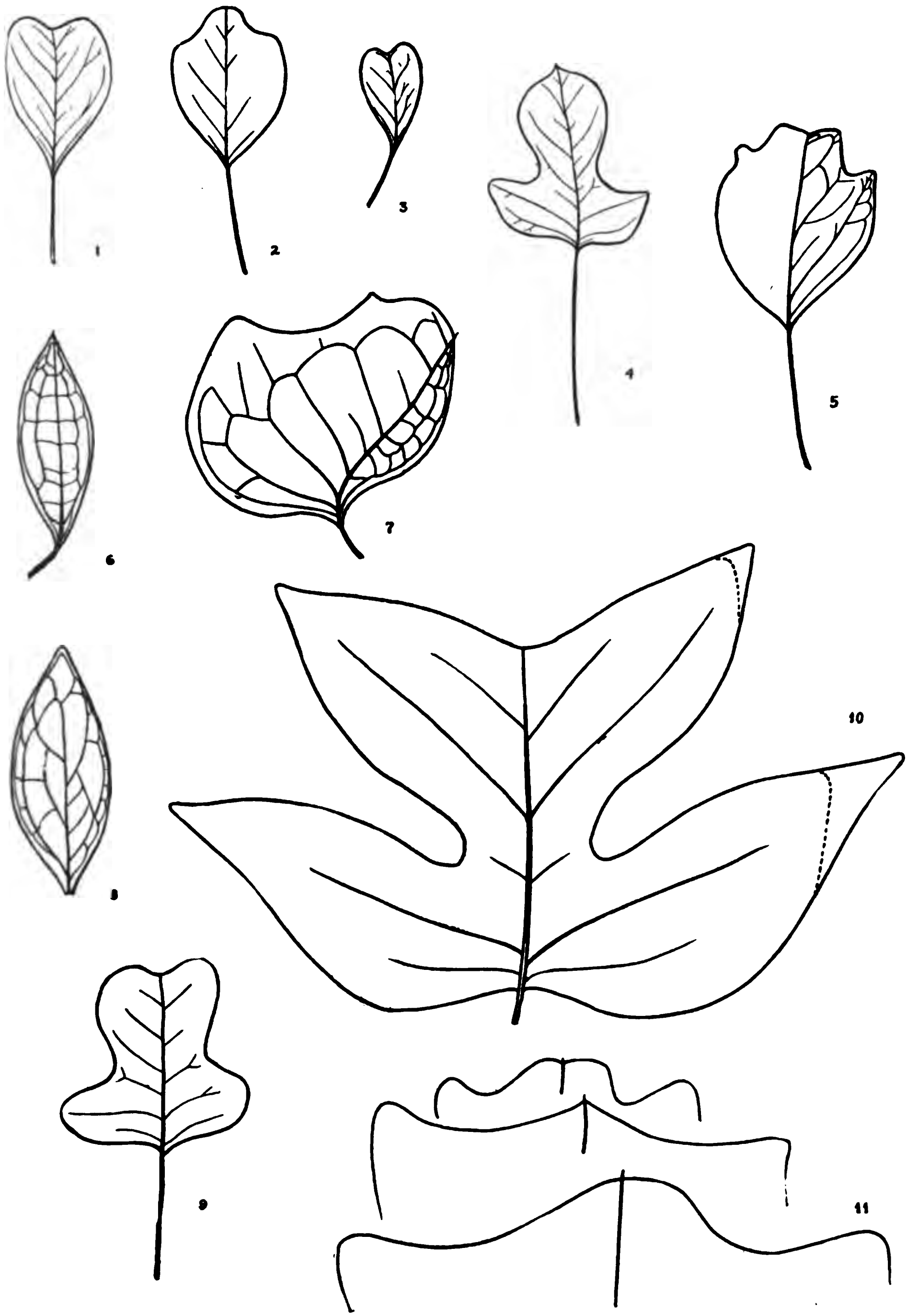
Fig. 9 shows a modern leaf which is identical with that of *Liriodendron Meekii* Heer, and I find many modern leaves simulating this form more or less closely; as a rule, however, the lateral lobes are more oblique than in the form figured.

Figs. 1 and 3 show modern leaves which are identical with the *Phyllites obcordatus* of Heer, and which serve in a measure to confirm the reference of this species (of *Phyllites*) to *Liriodendron primaevum*. They also strengthen our conviction that *Liriodendron primaevum* Newb., *Liriodendropsis simplex* Newb., and *Liriodendropsis angustifolia* Newb. are valid species of *Liriodendron*, notwithstanding the fact that this view is criticized in some quarters.

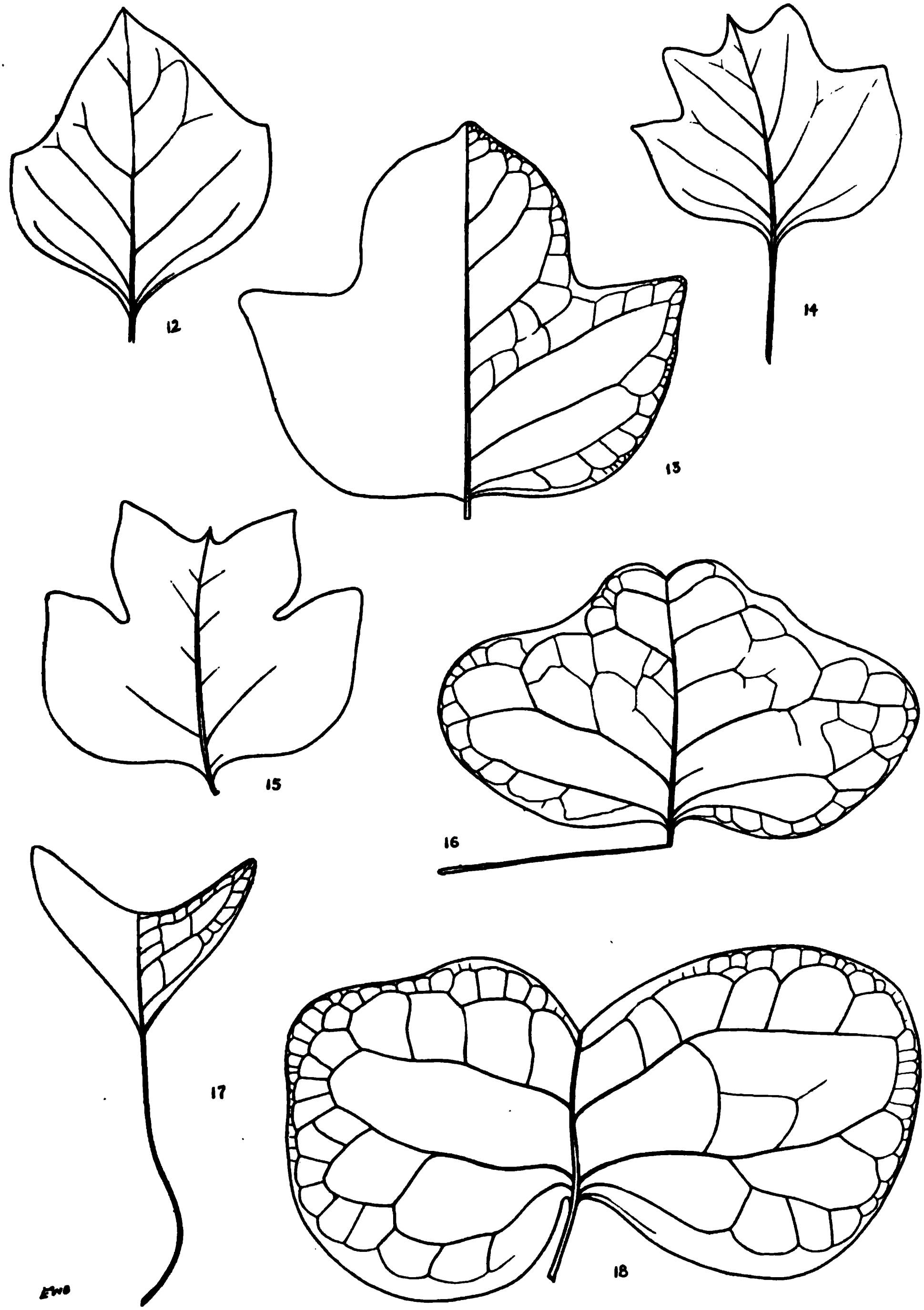
Fig. 2 shows a modern leaf which has reverted to a still earlier stage in the history of the genus, the stage in which the simple ovate leaf had not yet become emarginate at the apex.

Fig. 5 shows a leaf of peculiar form related in a general way to the form figured at 12 as resembling *Cissites acuminatus*, but narrower, with a slightly emarginate apex and rounded lobes, the lateral margins and the primaries being somewhat more ascending. Finally, at Fig. 17, we picture the reduced, two-lobed, long-petioled, *Liriophyllum*-like leaf which is often found on the tulip-tree where there has been some diminution of nourishment, such as is caused by proximity to flowers or among leaves developed from forced buds. While this form is not constant in such situations, it is fairly common, there being an ever-present tendency to produce leaves of this shape or approximating it. The bud-scale of the blossom often bears at its apex a true leaf-blade almost exactly similar to the one here figured. A number of these leaves are shown in the September (1901) number of TORREYA.* They show that whereas a bud-scale has always been considered the morphological equivalent of a leaf, in this genus they are morphologically stipules, or modified leaf-segments.

* Berry, E. W. Notes on *Liriodendron* leaves. TORREYA, 1: 105-107, *pl. 1, 2.* 1901.



LIRIODENDRON LEAVES.



LIRIODENDRON LEAVES.

When we look over these most diverse leaves, it is with difficulty that we can believe that they belong to but one species; were they found as fossils they would undoubtedly be referred to as many different species as there are leaves. However, they help to confirm the view that those ancient species of diverse shape are correctly identified as species of *Liriodendron;* and they also offer interesting evidence in support of the phylogenetical views advanced by the writer in the *Botanical Gazette.**

It is to be hoped that new material, which will throw a new or fuller light on the genealogy of the group, awaits the collector in the various strata which have so long furnished representatives of this genus. Careful search should also be made for species in the splendid American Tertiary series. *Liriodendron* is common enough in the European Tertiary and must have been present in America during the deposition of all the formations subsequent to the Cretaceous. It is also very probable that when the Tertiary and later formations of eastern Asia are explored new species will be brought to light, as our flora to-day has so much in common with that of eastern Asia, and as it is only in that region that our living species of *Liriodendron*—perhaps in the form of a geographical variety—is elsewhere found.

PASSAIC, N. J., January 18, 1902.

KEYS TO THE NORTH AMERICAN SPECIES OF THE COPRINEAE

BY F. S. EARLE

The tribe Coprineae includes those genera of the Agaricaceae in which the lamellae deliquesce on the ripening of the spores, forming a colored liquid. This is comparable to the method by which the spores are set free in the Gasteromycetes. It is held by some to be a primitive character and to indicate that this is the oldest group of the Agaricaceae.

* To be published shortly.

Key to the Genera of the Coprineae*

Spores, and at maturity the lamellae, black or blackish-brown. *Coprinus.*
Spores, and at maturity the lamellae, rusty brown or reddish-brown. *Bolbitius.*

Key to the North American Species of Bolbitius

1. Stipe pilose-villous; pileus sulphur yellow. *B. villipes* Fr.
   Stipe glabrous or floccose, not pilose-villous. 2.
2. Lamellae free. 3.
   Lamellae adnate; pileus light yellow; disc reddish. *B. nobilis* Pk.
   Lamellae long-decurrent; pileus bluish to rose-color. *B. macrorrhizus* B. & Mont.
3. Small; pileus 1–2½ cm. broad. *B. pulchrifolius* (Pk.) Mass.
   Larger; pileus 4–6 cm. broad. *B. radians* Morg.

Key to the North American Species of Coprinus

1. Universal veil present at least when young; pileus not splitting down the backs of the lamellae. 2.
   Universal veil absent; pileus membranaceous, splitting down the backs of the lamellae, smooth or scaly from the ruptured and exposed cells of the pileus. Sec. VI.
2. Universal veil remaining on the stipe as an annulus or as a volva. 3.
   Universal veil not forming an annulus or a volva. 4.
3. Base of stipe with a free-margined volva, annulus wanting. Sec. I.
   Annulus present at least when young, no volva. Sec. II.
4. Universal veil soon evanescent; pileus glabrate or with innate scales. Sec. III.
   Universal veil persisting on the pileus as patches, scales, fibrils of mealy granules (not glistening). Sec. IV.
   Universal veil (?) forming glistening, micaceous particles. Sec. V.

Coprinus—Sec. I.

No species recorded from North America.

Coprinus—Sec. II.

1. Annulus subpersistent, movable. 2.
   Annulus soon evanescent. 4.
   Annulus persistent, fixed, medial. *C. armillaris* Fr.
2. Pileus fleshy; lamellae linear. 3.
   Pileus membranaceous; lamellae ventricose. *C. squarrosus* Morg.
3. Large; pileus 8–10 cm. high. *C. comatus* Fr.
   Smaller; pileus 5–7 cm. high. *C. comatus breviceps* Pk.
4. Small; pileus 2–4 cm. broad. 5.
   Larger; pileus 5–11 cm. broad, lamellae broad. 6.
5. Spores large, 20–25 μ long; lamellae never rose-colored. *C. macrosporus* Pk.
   Spores smaller, 9 μ long; lamellae white to rose, then black. *C. variegata* Pk.

* In Engler & Prantl, Pflanzenfamilien, the peculiar genus *Montagnites* is included in the Coprineae. As this genus lacks the distinguishing character of deliquescent lamellae and diverges widely in other important characters it seems best to exclude it.

6. Pileus with innate brown squamules. *C. atramentarius* (Bull.) Fr.
Pileus floccose-tomentose, then glabrate. *C. quadrifidus* Pk.

COPRINUS—SEC. III.

1. Spores roughened; pileus campanulate, grayish-brown. *C. insignis* Pk.
Spores smooth. 2.
2. Pileus smooth or rimose; spores subhyaline. *C. fuscescens* (Schaeff.) Fr.
Pileus with innate brown scales; spores fuscous. *C. stenophyllus* Mont.

COPRINUS—SEC. IV.

1. Universal veil thick, breaking into persistent patches. 2.
Universal veil breaking into scales or fibrils. 3.
Universal veil breaking into mealy granules. *C. semilanatus* Pk.
2. Pileus calyptrate; spores large, 15–20 μ. *C. calyptratus* Pk.
Pileus with broad white patch-like scales; spores 8–10 μ long. *C. ebulbosus* Pk.
3. Lamellae attached to the stipe. 4.
Lamellae free. 8.
4. Prevailing color white or gray. 5.
Prevailing color yellow or brown. 7.
5. Small; pileus 1 cm. broad or less. *C. brassicae* Pk.
Larger; pileus reaching 2–3 cm. in width. 6.
6. Pileus pure white. *C. niveus* (Pers.) Fr.
Pileus gray or pallid. *C. laniger* Pk.
7. Pileus soon expanded, fuscous. *C. Seymouri* Pk.
Pileus cylindrical or campanulate, pale ochraceous. *C. virgineus* Bann. & Pk.
Pileus campanulate, fuliginous, disc spadiceous. *C. domesticus* (Pers.) Fr.
8. Prevailing color white or gray. 9.
Prevailing color yellow or brown. 11.
9. Stipe glabrous. 10.
Stipe floccose, at least when young. *C. Jonesii* Pk.
10. Spores navicular. *C. Cubensis* B. & C.
Spores curved, stipe reddish. *C. Spraguei* B. & C.
Spores globose. *C. rotundisporus* Pk.
Spores ovate; pileus 2–5 cm. broad. *C. arenatus* Pk.
Spores ovate or oval; pileus 8–12 mm. broad. *C. nycthemerus* Fr.
11. Pileus plumbeous, disc fuscous. *C. plumbeus* Pk.
Pileus pale fuscous, subglobose. *C. subglobatus* B. & C.
Pileus pale buff, campanulate. *C. lacerata* Pk.

COPRINUS—SEC. V.

1. Pileus campanulate, fulvo-ferruginous. *C. micaceus* (Bull.) Fr.

COPRINUS—SEC. VI.

1. Pileus more or less scurfy or scaly. 2.
Pileus glabrate. 6.
2. Lamellae attached to the stipe. 3.
Lamellae free. 5.

3. Pileus gray.	*C. apiculatus* Pk.
Pileus reddish.	*C. ephemerus* Fr.
Pileus yellowish-brown, darker with age.	4.
4. Pileus small, 1–1½ cm. broad; lamellae subdistant.	*C. aquatilis* Pk.
Pileus larger, 3–5 cm. broad; lamellae crowded.	*C. Berkeleyi* Mont.
5. Pileus with brownish scurf.	*C. Wrightii* B. & C.
Pileus with grayish scurf.	*C. radiatus* Fr.
6. Lamellae attached to the stipe.	7.
Lamellae free, not reaching the stipe.	*C. plicatilis* (Curt.) Fr.
7. Growing from a sclerotium.	*C. sclerotigenus* E. & E.
Not from a sclerotium.	8.
8. Lamellae subdistant.	*C. silvaticus* Pk.
Lamellae crowded.	*C. angulatus* Pk.

NEW YORK BOTANICAL GARDEN.

HANDLING HERBARIUM SPECIMENS IN CLASSES

BY FRANCIS E. LLOYD

Teachers who make use of herbarium material of any kind for demonstration in classes, especially if the number of students is large, have experienced considerable discomfort incident to the danger of damage to the specimens by rough handling. But as many of us know, with even careful handling, the danger is still great, and any method of avoiding the danger at small cost will be welcomed.

Heretofore, glazed frames of various forms have been used to some extent, and these have generally a fair degree of efficiency. The only serious objection has been their weight and costliness, and the danger of glass breakage is here, too, not slight. At any rate such frames have not come into general use. The objection may be avoided, however, by the use of sheets of transparent celluloid or xylonite instead of glass. These sheets may be used in two ways, as follows.

If it is desired to show ordinary herbarium specimens a pocket may be constructed large enough to engage an herbarium sheet of ordinary size. The pocket is made by taking a sheet of stiff cardboard and of xylonite of the same size. One edge of both xylonite and cardboard should be bound with photographers' or

picture-framers' binding strips, and the sheets then laid together and bound around the other three edges. If it is desired, the xylonite and cardboard may be separated by narrow strips of Bristol-board of appropriate thickness. Such an apparatus is somewhat pliable, very durable, light and highly protective to the specimen temporarily placed therein.

Specimens to show points of morphological interest may be mounted directly on cards of any desired size, labelled according to wish, then covered with xylonite and bound with paper strips. I have found 6½" x 8½" photographers' mounting-cards very useful and a good convenient size. Specimens showing adaptations of various kinds, of smaller plants such as mosses, liverworts, lichens and the like, may be thus mounted at small cost in a quantity of duplicates. These may then be used repeatedly, effecting an immense saving of time and energy to the teacher who has now always at hand plenty of the choicest material, it a little effort is once made to collect the best specimens available and to mount them properly. Pressing and drying is made quick and easy by the method devised by Rostowzew, and recently described by Richards.*

Such preparations will stand an enormous amount of wear and tear; are, in fact, practically indestructible. It is wise to fasten the specimens well on the cards, strips being used if necessary. To an ingenious teacher this method of handling specimens will be susceptible of many useful modifications. Xylonite may be obtained from dealers in general laboratory supplies and probably from dealers in photographic materials.

TEACHERS COLLEGE, COLUMBIA UNIVERSITY.

* TORREYA, 1: 145. D. 1901.

NOTES ON SOUTHWESTERN PLANTS

BY T. D. A. COCKERELL

Peritoma serrulatum albiflorum. Flowers pure white. (*Cleome serrulata f. albiflora* Ckll. Proc. Acad. Nat. Sci. Phila. 1896 : 34; misprinted *C. albiflora*). This white-flowered form occurs occasionally in Colorado and northern New Mexico, along with the type; but for many miles westward of Peach Springs, Arizona, along the railroad, it constitutes a local race, to the exclusion of the type. At Williams, Arizona, on the other hand, the plants are all of the typical form.

Fallugia micrantha Ckll. Entom. News, 1901 : 41. This northern form was briefly described in the place cited, where an account is given of its insect visitors. It is readily known by its small flowers, 23–26 mm. diameter. At Las Vegas Hot Springs (7,000 ft.) it reaches its greatest altitudinal limit, and is completely dioecious, which is not the case at Mesilla Park.

Lupinus Helleri Greene, Pittonia, **4**: 134. Santa Fé, N. M. This name may be objected to on account of the prior *L. Hellerae* Heller, though I do not consider the names identical. However, it appears to me that *L. Helleri* is *L. decumbens argophyllus*, A. Gray (Pl. Fendl. 37. 1849), so its proper name will be **Lupinus argophyllus**. The type locality of *argophyllus* is "around Santa Fé," where, in fact, it is abundant.

Carduus ochrocentrus forma **albiflora**, flowers white. This is quite common in the region just north of Las Vegas, N. M., growing with the type. I record it because Britton (Man. Flora N. E. States, 1032) says "flowers purple (rarely white ?)." The plant which grows around Las Vegas and Santa Fé is the real *C. ochrocentrus*; the common plant of Colorado is somewhat different, and may have to be separated.

Kallstroemia brachystylis Vail. Common at Raton, N. M., which is only just south of the Colorado border. This extends its range considerably northward.

Leucampyx Newberryi A. Gray. On Crews' Mesa, near Beulah, N. M., I found a plant with some flowers having pale

pink rays. The ordinary white form is abundant in the same locality.

Taraxacum Taraxacum (L.) Karst. In full flower April 23, 1901, at Las Vegas, N. M., attracting the very earliest bees of the season. Two caught on the flowers were females of *Halictus anomalus* Rob., and *H. pruinosus* Rob. Müller says there are 100 to over 200 florets in a head of the dandelion ; seven Las Vegas flowers gave these numbers : 120, 100, 150, 104, 138, 150, 145.

EAST LAS VEGAS, NEW MEXICO.

SHORTER NOTES

A NEW PEPEROMIA FROM THE ISLAND OF ST. KITTS.—**Peperomia Davisii** Britton, n. sp. Climbing on the bases of trees, finely puberulent nearly all over, 1.5–3 dm. long. Leaves orbicular-ovate, abruptly acute, thick, distinctly cordate at the base, 3–4 cm. long and about as wide, palmately veined, the midvein rather prominent and broad, the lateral veins 3 or 4 pairs, very delicate, the stout petiole as long as the blade or shorter; spikes geminate, their common peduncle 3–4 cm. long, bearing at the top a lanceolate-oblong acute bract about 1 cm. long, the peduncle of one of the spikes bearing 1 or 2 similar smaller bracts, that of the other spike bractless ; spikes 3–4 cm. long.

On forest slopes of Mount Misery, Island of St. Kitts, British West Indies, September, 1901, N. L. Britton and J. F. Cowell, no. 506. Not uncommon in the forests of this island, at altitudes of 600 to 1,000 meters ; now in cultivation at the New York Botanical Garden. The specific name is in honor of Mr. B. S. Davis, a resident planter of St. Kitts, who is much interested in its flora and who kindly gave us valuable assistance in our exploration of its forests on the Belmont and Lambert estates. The species is probably nearest related to *Peperomia inophylla* Griseb., of Cuba, differing markedly in its cordate leaves and geminate spikes. N. L. BRITTON.

ILEX MYRTIFOLIA WITH YELLOW FRUIT.—The occurrence of yellow fruit in *Ilex opaca* has long been known to botanists,

having been mentioned as long ago as 1788 by Thomas Walter (Fl. Car. 241), who treated our species as identical with the European *Ilex Aquifolium*, *I. opaca* not having been described until the following year. A yellow-fruited form of *I. verticillata* from Massachusetts has recently been described by Dr. Robinson (Rhodora, 2 : 106. My. 1900) as forma *chrysocarpa* (and elevated to a variety later in the same year by Mr. Heller in his Catalogue of North American Plants). It would therefore not be surprising if other species of the same genus should occasionally present the same variation, though I find no published record of it outside of the two just mentioned.

But a few days ago I received from Miss Laura Bennett of Camilla, Georgia, some specimens of *Ilex myrtifolia* Walt. (a species ranging from North Carolina to Florida and Louisiana), with yellow berries, but otherwise indistinguishable from the normal form. In the absence of other known differences it does not seem worth while to give a distinctive name to this yellow-berried form.

Miss Bennett remarks that it is not so common as the various red-berried species, and for that reason is more highly prized; both kinds being used for Christmas decorations.

ROLAND M. HARPER.

BRYOLOGICAL NOTES.—Miss Harriet Bailey has collected, in the vicinity of Kentville, Nova Scotia, this last summer, a number of rare mosses, which she has donated to the Garden Herbarium. Among them is *Bryum proligerum*, growing on a hard sandy cliff in fine condition, the stems crowded with propagula, and one plant fruiting. *Raphidostegium Jamesii* also was collected on spruce trunks, its usual habitat.

Mr. E. J. Hill has sent specimens of *Fissidens grandifrons*, collected on the wet face of a sandstone cliff at Starred Rock, Utica, Illinois, which show particularly well the method of propagation of this species, thus far not known to fruit in America. It forms small lateral buds, which send out radicles when the buds first develop; ultimately they drop off, forming new plants. This species is not recorded by Correns.

ELIZABETH G. BRITTON.

HYPOCHAERIS RADICATA L.—In Dr. Britton's recently published " Manual of the Flora of the Northern States and Canada," the habitat of this plant is given as " waste places, Long Island to New Jersey." Last summer it was discovered to be well established in three localities on Staten Island, namely on Todt Hill, near Egbertville, and in the grounds of the S. R. Smith Infirmary. In the last named locality it persists in spite of the mowing machine. An interesting habit of the plant is the closing of its flowers early in the afternoon, even on bright sunny days.

WILLIAM T. DAVIS.

PROCEEDINGS OF THE CLUB

WEDNESDAY, JANUARY 29, 1902

The meeting was held at the Museum of the New York Botanical Garden; seventeen persons present, Dr. MacDougal in the chair.

The first paper was by Dr. Britton, entitled "Notes on the Crassulaceae," and is to appear in print, being a part of a contribution toward the projected Flora of North America. Remarks followed by Dr. C. C. Curtis, Dr. Rydberg, Dr. Small, Dr. MacDougal and Mrs. Britton. The distribution of the Crassulaceae was commented on, Dr. Britton speaking of the isolated colonies of high mountain species, which seem to have continuously interbred and in which this process seems responsible for the development of specific characters.

The second paper, by Professor F. S. Earle, entitled "New Genera of Fungi," founded on representatives from California and New Mexico, will soon appear in the *Bulletin of the New York Botanical Garden.*

Professor Earle also exhibited a rosebush from under glass at the Garden, the roots of which had been attacked by a fungus now under examination. The mycelium is abundant in the fibrous roots, also in the bark and cambium immediately above ground, and has caused a sudden yellowing and drooping of the leaves. The rosebush shown had been artifically infected from cultures of a fungus taken from similarly diseased bushes grown in New Jersey.

Dr. MacDougal recalled the suggestion that potatoes are the result of fungal infection of the underground stem; it is said that no one has ever examined a potato tuber without finding traces of a fungus in it. In many cases of precocious blooming among both wild and cultivated plants, the cause is stimulus from similar infection.

Dr. MacDougal also exhibited specimens of *Raoulia* and *Haastia*, known as "vegetable sheep," two remarkable alpine xerophytes from an altitude of 4,000 feet on the mountains of New Zealand. They are composites related to *Gnaphalium*.

Dr. Rydberg spoke of a Rocky Mountain phlox with similar growth in cushion-like masses.

Mrs. Britton reported on the progress of her studies of a *Vittaria* collection made by Dr. Britton at St. Kitts, and exhibited drawings. There is a present indication that two different specific names have been in use for different stages of the same life history.

EDWARD S. BURGESS,
Secretary.

TUESDAY, FEBRUARY 11, 1902

The meeting was held at the College of Pharmacy; the President, Judge Addison Brown, in the chair; 37 persons present.

The President presented for distribution to members of the Club copies of Dr. Gattinger's Flora of Tennessee.

Dr. A. J. Grout delivered an address, illustrated by numerous lantern slides, on the botanical features of Mt. Mansfield, Vermont. A general discussion of the distribution of mountain plants followed the address, which was participated in by Dr. Underwood, Dr. Rydberg, Dr. Grout, Mr. Chamberlin, Dr. Murrill and the Secretary *pro tem*.

The following is an abstract of Dr. Grout's paper:

The alpine and subalpine flora of Mt. Mansfield and Smugglers' Notch is of great interest. While Mt. Mansfield (4329 ft.) is not so high as Mt. Washington, and the Notch has not the profile or the flume that have rendered the Franconia Notch historic, yet each has scenic and floral attractions all its own, and but little inferior to those more widely known in the White Mountain region.

The "spring" which wells up a full-grown brook just at the entrance of the Notch with water of icy coldness at all seasons of the year; Bingham Falls a few miles farther down this same brook, with its fantastic gorge and wild cascade; the steep cliffs of the Notch rising thousands of feet on either hand, with their numerous ravines and rich subalpine flora, all have a potent attraction to every one who has visited and seen.

Along these rivulets, by whose wearing action the cliffs have been made possible to man, are found *Dryopteris fragrans, Woodsia glabella* and *W. alpina, Pellaea gracilis, Polystichum Braunii, Asplenium viride, Blephariglottis grandiflora, Saxifraga oppositifolia, S. Aizoön* and *S. autumnalis, Astragalus Jesupi, Hedysarum Americanum, Draba incana, Arenaria verna, Pyrola minor, Gentiana acuta, Castilleja acuminata, Erigeron hyssopifolius, Solidago Virgaurea,* vars. and that choicest of beauties and wonders, the insect-eating *Pinguicula vulgaris.*

On the summit of the mountain the scenery is marvelously beautiful, whether one clambers down to the "Lake of the Clouds" on a clear day and looks back at the rugged majestic "Chin" or sits on the western side of the "Nose" at sunset and sees the distant golden glint of Lake Champlain, or rises before dawn and watches the sun drink up the rolling seas of fog.

The summit flora also has its attractions for the botanists; *Polygonum viviparum, Comandra livida, Viburnum pauciflorum, Salix Uva-ursi, Vaccinium caespitosum, V. uliginosum, Vitis-Idaea, Nabalus Boottii* and *Diapensia* are some names to conjure one's exchanges with.

And mosses and lichens are very abundant. The speaker has personally collected there two varieties new to North America, and not yet collected elsewhere on the continent, namely, *Hypnum fluitans Atlanticum* Ren. and *Dicranum longifolium subalpinum* Milde.

A comparison of the flora of this region and that of Mt. Washington, brings out the fact that here are several northern plants not found at the loftier elevation of the Mt. Washington region, although the conditions there are more severely alpine and supposedly more favorable. None of the saxifrages mentioned above can be

found in the White Mountain region, but another alpine species, *S. rivularis*, occurs there. This is only one of several similar cases hard to account for, on a theory of a residual flora, as the regions are so near to each other and the conditions are so similar.

N. L. BRITTON,
Secretary pro tem.

NEWS ITEMS

Mr. Elmer D. Merrill has resigned his position as assistant in charge of the agrostological collections of the U. S. Department of Agriculture in order to accept an appointment in the Philippines.

Dr. Valery Havard, Deputy Surgeon General of the United States Army, recently Chief Surgeon of the Division of Cuba, is now stationed at Ft. Monroe, Virginia.

Among the botanists visiting New York of late have been Professor F. A. F. C. Went, of Utrecht, Holland, Professor Conway MacMillan of the University of Minnesota, and Dr. Theodore Holm, of Washington, D. C.

The February number of the *Journal of Botany* announces the death of Mr. Alfred W. Bennett, one of the authors of Bennett and Murray's Cryptogamic Botany, and otherwise well known as a botanist.

Two new Memoirs of the Torrey Botanical Club were published in February. "The comparative Embryology of the Rubiaceae," by Francis Ernest Lloyd completes No. 1 (pp. 1–112; pl. 1–15) of Vol. 8; and "The Lejeuneae of the United States and Canada," by Alexander W. Evans, constitutes No. 2 (pp. 113–183; pl. 16–22) of the same volume. "The Life History of *Vittaria lineata*," by E. G. Britton and Alexandrina Taylor, completing Vol. 8, is soon to be published. The price of No. 1, separately, is $1.75, of No. 2, $1.00.

Vol. 2 No. 4

TORREYA

April, 1902

ADDITIONS TO THE RECORDED FLORA OF LONG ISLAND

By A. J. Grout

The following list of plants contains additions to the list published by Dr. Smith Ely Jelliffe in 1899. A few of the plants were in the herbarium of the Brooklyn Institute of Arts and Sciences at the time Dr. Jelliffe's list was published. Some others were in the herbarium of the late Rev. Dr. George D. Hulst, which has recently been presented to the Museum. Shortly before his death Dr. Hulst prepared a list of additions to Dr. Jelliffe's Flora, which contained a number of species not incorporated here because of the lack of specimens of such in any accessible herbarium.

The greater portion of the flowerless plants have been collected by the writter during the past three years and unless otherwise noted all plants listed were collected by him. The fungi are very poorly represented in Dr. Jelliffe's list and it is to be hoped that some one who has made a study of these plants will come forward with additional information.

Fungi

Anthurus borealis Burt. In a back yard, Brooklyn; brought in by a High School boy.

Microsphaera quercina (Schw.) Burrill. On *Quercus alba*. Jamaica.

Microsphaera grossulariae (Wallr.) Lév. Common on leaves of *Sambucus Canadensis*.

Phyllactinia suffulta (Reb.) Sacc. On chestnut leaves, Jamaica. Undoubtedly common.

[The exact date of publication of each issue of Torreya is given in the succeeding number. Vol. 2, No. 3, comprising pages 33–48, was issued March 12, 1902.]

Hepaticae

Anthoceros punctatus L. Muddy borders of stagnant pools, Forest Park. Determined by Dr. M. A. Howe.

Musci

Buxbaumia aphylla L. Soil in sandy woods near water works, Jamaica South.

Pleuridium subulatum (L.) Rabenh. Sandy fields, Lawrence.

Mnium punctatum L. var. *elatum* Schimp. Swamp, Jamaica.

Mnium rostratum Schrad. On soil, Jamaica.

Thelia asprella (Schimp.) Sulliv. Bark of tree, Cold Spring.

Thelia Lescurii Sulliv. Sandy soil by railroad track, Rockville Center, Lynbrook.

Hypnum chrysophyllum Brid. Sticks and hummocks in swamps. Valley Stream. New Lots, *Brainerd.*

H. cordifolium Hedw. Bare wet spots in swamps, Valley Stream.

H. crista-castrensis L. Rotting base of tree, Cold Spring.

H. molluscum Hedw. Sandy soil in woods, Jamaica. Very abundant at Northport.

H. Patientiae Lindb. Soil in swamps, Valley Stream.

Plagiothecium Ruthei Limpr. Abundant on hummocks and about bases of trees, Valley Stream.

This is Dr. Best's determination of the moss issued as nos. 55 and 55a of my N. Am. Musci Pleurocarpi, confirmed by J. Cardot and Dr. E. Levier. It is monoicous, hence is not *P. sylvaticum.* It is too strongly differentiated from *P. denticulatum* to be with propriety included under that species, although I was at one time inclined to place it under forma *propagulifera* Ruthe, because of the numerous protonema-like propagula borne on the base of the midribs of the leaves. A very striking character of this plant is the folding together of the leaf at the base to sheathe the leaf next above.

Plagiothecium striatellum (Brid.) Lindb. Common in swamps, but having spreading leaves like a *Campylium.*

Raphidostegium admistum (Sulliv.). *Hypnum admistum*

Sulliv. Proc. Am. Acad. **5**: 289. 1861. On peaty soil near swamp, Jamaica.

R. recurvans (Michx.) J. & S. Peaty soil in swamp, Valley Stream.

Brachythecium acutum (Mitt.) Sulliv. On ground in swamps, Valley Stream.

B. Noveboracense Grout, Bryologist, July, 1900. Soil in swamp, Valley Stream.

B. oxycladon (Brid.) J. & S. Forest Park.

Bryhnia Novae-Angliae (Sulliv. & Lesq.) Grout. Common in swamps on Long Island.

Eurhynchium strigosum var. *praecox* (Hedw.) Husnot. On soil, Prospect Park.

Climacium Kindbergii (R. & C.) Grout. Common on sticks and hummocks in swamps of Long Island.

Pylaisia Schimperi R. & C. Bark of apple trees, Cold Spring.

PTERIDOPHYTA

Dryopteris simulata Davenp. Long Island, *Hulst.*

Equisetum hyemale L. Salt Meadows, Flushing Creek. New Lots, *Brainerd.*

E. sylvaticum L. Glen Cove, *Brainerd.*

Lycopodium lucidulum Michx. Not infrequent in the cool swamps of Long Island.

SPERMATOPHYTA

Potamogeton crispus L. Cold Spring Harbor, *Hulst.*

Scirpus caespitosus L. Reported in Dr. Jelliffe's list, but undoubtedly an error.

Quercus prinoides Willd. Wading River, *Miller.*

Rumex Patientiae L. Brooklyn, Forbells, *Hulst.*

R. persicarioides L. Montauk Point, *Hulst.*

Chenopodium Boscianum Moq. Rockaway, *Hulst.*

Amaranthus crispus (Lesp. & Thev.) Braun. Kings County, *Calverly.*

Lychnis Coronaria (L.) Desv. Hicksville, *Hulst.*

Ranunculus hispidus Michx. Common in open woods.

R. septentrionalis Poir. Queens County, *Calverly.*

Papaver dubium L. In fields. Oyster Bay, *Hall.*

Alliaria Alliaria (L.) Britton. Flatbush, Woodhaven. Collector unknown.

Cardamine Pennsylvanica Muhl. In stream near New Lots, *Brainerd.*

C. flexuosa With. Forbells, *Hulst.*

Rubus setosus Bigel. Jamaica, *Hulst.*

R. Baileyanus Britton. Sandy soil near shore, Rockaway.

Potentilla arguta Pursh. Springfield, *Hulst.*

P. intermedia L. Flushing, *Hulst.*

Amelanchier Botryapium (L.) DC. Low swampy thickets, Jamaica.

Lotus corniculatus L. On ballast, Brooklyn, *Hulst.*

Geranium Bicknellii Britton. Aqueduct, *Hulst.*

G. dissectum of Jelliffe's list is probably an error, as Dr. Hulst's specimen so labeled is *Erodium.*

Euphorbia maculata L. Brooklyn and Queens, *Calverly;* Long Island, *Brainerd.*

Hypericum prolificum L. Queens County, *Calverly.*

Elatine Americana (Pursh) Arn. Suffolk, *F. F. Allen;* Gowanus, *Brainerd.*

Lechea villosa Ell. Woodhaven and Cypress Hills, *Hulst.*

Viola Atlantica Britton. Abundant in moist meadows at Valley Stream.

Gaura biennis L. Long Id., *Zabriskie;* Queens County, *Calverly.*

Zizia cordata (Walt.) DC. Common in woods about Brooklyn.

Asclepias pulchra Ehrh. Forbells, *Hulst.*

Clinopodium vulgare L. Maspeth, *Hulst.*

Physalis heterophylla Nees. Moist railroad embankment, Far Rockaway.

Petunia parviflora Juss. On ballast, Brooklyn, *Hulst.*

Pedicularis lanceolata Michx. Forbells, *Hulst.*

Phryma Leptostachya L. Cypress Hills, *Hulst.*

Plantago aristata Michx. Cold Spring Harbor, *Hulst.*

P. media L. Brooklyn, *Hulst.*

Lonicera Xylosteum L. Flushing.

Leontodon nudicaule of Jelliffe's list is evidently based on a specimen of Dr. Hulst's so labeled which specimen is

Picris hieracioides L.

Lactuca sagittifolia Ell. Rockaway.

Crepis virens L. Richmond Hill, Cypress Hills, *Hulst.*

Xanthium Canadense Mill. The common form is var. *echinatum.*

Solidago juncea Ait. Cypress Hills, *Hulst.*

Hypochaeris radicata L. Cedarhurst.

Antennaria neglecta Greene. Common in sandy fields.

Senecio obovatus Muhl. Richmond Hill, *Hulst.*

Boys' High School, Brooklyn.

A KEY TO THE NORTH AMERICAN GENERA AND SPECIES OF THE HYGROPHORÉAE.—I

By F. S. Earle

Key to the Genera

1. Spores black or dark brown. — A. Gomphidius.
   Spores white or whitish. — 2.

2. Usually parasitic on other agarics; basidiospores mostly replaced by chlamydospores. — B. Nyctalis.
   Not parasitic on agarics; no chlamydospores. — 3.

3. With a glutinous veil when young, leaving a more or less persistent annulus. — C. Limacium.
   With no veil or annulus. — D. Hygrophorus.

A. Key to the North American Species of Gomphidius

1. Pileus white or whitish. — 2.
   Pileus some shade of red or brown. — 3.
   Pileus dingy pink; lamellae whitish; stipe yellow. — *G. flavipes* Pk.

2. Stipe yellow, shorter than the diameter of the pileus. — *G. maculatus* (Scop.) Fr.
   Stipe white, longer than the diameter of the pileus. — *G. furcatus* Pk.

3. Stipe concolorous (reddish or brownish). — 4.
   Stipe at first white or whitish. — 7.

4. Entire plant blackening in drying. *G. Oregonensis* Pk.
Plant not blackening, or only the gluten blackening. 5.

5. Plant not at all blackening; stipe more or less tomentose. 6
The gluten on pileus blackening; stipe pruinose at base. *G. vinicolor* Pk.

6. Large, 5–8 cm.; stipe longer than diameter of pileus, thinly brown-tomentose. *G. viscidus* (L.) Fr.
Smaller, 2–4 cm.; stipe shorter than diameter of pileus, yellow-tomentose below, glabrate above. *G Alabamensis* Earle.

7. Entire plant turning jet black in drying. *G. nigricans* Pk.
Plant not blackening. 8.

8. Pileus purplish brown; stipe white, yellow within. *G. glutinosus* (Schaeff.) Fr.
Pileus rose-color; stipe white, base and interior flesh-color. *G. roseus* Fr.

B. Key to the North American Species of Nyctalis

1. Parasitic on *Russula*, etc. *N. asterophora* Fr.

C. Key to the North American Species of Limacium

1. Pileus white or whitish, disc often colored. 2.
Pileus grayish yellow. *L. elegantulum* (Pk.)
Pileus with some shades of blue or violet. 7.
Pileus grayish brown or blackish brown. 8.

2. Pileus with more or less yellow on disc. 4.
Pileus with brownish disc and innate black fibrils. *L. virgatum* (Pk.) P. Henn.
Pileus white throughout. 3.

3. Spores irregular-sphaeroid, 5–6 μ. *L. eburneum* (Bull.) Schroet.
Spores ellipsoid, 6.5–7.5 $\mu \times$ 4–5 μ. *L. sordidum* (Pk.)

4. Lamellae stained greenish yellow with age; pileus covered with yellow gluten. *L. paludosum* (Pk.)
Lamellae becoming flesh-color; disc yellow or reddish. *L. flavo-discum* (Frost)
Lamellae white, unchanging. 5.

5. Pileus with deciduous yellow flecks on the disc and lamellae. *L. chrysodon* (Batsch) Schroet.
Pileus smooth, glutinous. 6.

6. Stipe white, farinose above. *L. luteum* (Johns.)
Stipe yellowish white, apex roughened. *L. Laurae* (Morg.) P. Henn.

7. Pileus bluish-alutaceous, lamellae darker. *L. caerulescens* (B. & C.)
Pileus violaceous when moist, paler when dry, lamellae violaceous. *L. subviolaceum* (Pk.)

8. Margin of lamellae entire; stipe white or brown-spotted. *L. fuliginеum* (Frost) P. Henn.
Margin of lamellae erose; stipe pallid or brownish. *L. Morrisii* (Pk.)

SHORTER NOTES

A Saxifrage from the Queen Charlotte Islands and its Relatives.—Among the plants collected on the Queen Charlotte Islands by an expedition from the American Museum of Natural History and recently given to the New York Botanical Garden, is a specimen of a species of *Saxifraga* heretofore not represented in our herbaria. The plant belongs to the subgenus Arabidia which, prior to the acquisition of the plants referred to, was represented in North America by six species. These six species were equally divided between eastern and western North America. One species is common in the southern Alleghenies, two are found in Labrador and Greenland, while the remaining three are confined to the territory from the Rocky Mountains to the Pacific Ocean.

In the case of some of the species of this group the flowers are mainly replaced with bulblets, but the plant under consideration is destitute of bulblets and bears flowers about thrice the size of those borne on any of the other species. I shall name the species after the collector, Dr. C. F. Newcombe:

Saxifraga Newcombei.—Perennial, acaulescent, the caudex short. Leaves basal; blades spatulate, 4–8 cm. long, sessile, coarsely serrate-dentate above the middle, more or less glandular-pubescent and ciliate: scapes solitary, erect, 12–22 cm. tall, simple below the inflorescence, glandular-villous, corymbosely branched above: bracts similar to the leaves, but smaller and relatively less toothed: hypanthium nearly flat, 1.5–2 mm. broad: sepals ovate to oval, 3–5 mm. long, obtuse, glabrous or nearly so, usually purple, becoming reflexed: petals white, the three upper 7.5 mm. long, with lanceolate or oblong-lanceolate bimaculate blades, truncate or cordate at the base, and claws about 1 mm. long, the two lower petals with oblong or elliptic blades 8 mm. long: filaments subulate, 4 mm. long: fruit not seen.

Type specimen from the Queen Charlotte Islands, collected during the summer of 1901, in the herbarium of the New York Botanical Garden. It is most closely related to *Saxifraga ferruginea* Graham, but this species is smaller in every way, the flowers being barely one third as large, while the pubescence is rufous instead of pale as in *S. Newcombei.* J. K. Small

REVIEWS

MacDougal's Elementary Plant Physiology *

Dr. MacDougal's new elementary text-book of plant physiology s logically a revised edition of his Experimental Plant Physiology brought out in 1895, but a consideration of its contents shows that it is in fact a new book differing widely both in method of treatment and arrangement of subject matter from the earlier text. It is also to be said that the new book is an elementary manual adapted to the needs of subcollegiate grades and that in method of attack and sequence of the subject matter it is altogether different from the advanced text-book by the same author. The program of the contents is as follows: Chapter I. Introductory. II. Growth. III. Reproduction and Germination. IV. Exchanges and Movements of Liquids and Gases. V. Nutrition. VI. Respiration, Digestion and Fermentation. VII. Stimulation and Correlation.

FIG. 64. Apparatus for demonstration of relation of plants to atmosphere. *A*, candle. *B*, match held in end of bent glass rod. *C*, sanded paper. *D*, position of glass rod when match is applied to candle.

These features are clearly presented by text, illustration and experiment. The text is so arranged that the student must gain self-reliance in performing the experiments, and by observation

* MacDougal, D. T. Elementary Plant Physiology. 8vo. Pp. i–xi + 138. London and New York, Longmans, Green and Co. 1902. $1.20.

and reasoning draw his own conclusions regarding the functions of organs and their adjustment to environment. The suggestions and appliances for conducting the various experiments will be found highly satisfactory. While the experiments are simple and easily prepared, attention is directed to the performance of each demonstration and to the proper construction of the apparatus. The author's device for the demonstration of the evolution of oxygen by green plants in sunlight and the relations of the plant to the air, as shown in Fig. 64, is a typical demonstration, and illustrates the author's care in the manipulations, and in setting forth scientifically complete experiments.

One of the most commendable features of the book is the continued emphasis given the more manifest structures and functions. The plant is constantly treated as a living organism responsive to the forces playing upon it and always showing a purposeful reaction. This feature is worthy of more than passing commendation. It not unfrequently happens that the student loses sight of the nature of the reaction in the stress laid upon its exact measurement by ordinary methods, and the efficiency of elementary courses is frequently seriously interfered with by the mathematical exactness required in the prosecution of the work.

It seems to us that the author is very happy in the introductory portion of the subject by the consideration of growth. While this procedure may violate the logical arrangement of the subject yet it plunges the student at once in the first day of his course into a series of observations and experiments easily made which are sure to awaken the keenest interest. It is, in fact, immaterial for the time being, whether he may be acquainted with the intimate structure of the growing organs or not. Ample opportunity for acquiring such information soon follows. The advantage derived from giving the student a chance to gain some accurate information of his own at first hand upon a familiar phase of the activity of the plant is obvious and the training received will enable him to appreciate better what might be termed the more fundamental portions of the subject in the work that follows.

C. C. CURTIS.

PROCEEDINGS OF THE CLUB

Wednesday, February 26, 1902

This meeting was held at the Botanical Garden; Dr. Britton in the chair; 23 persons present.

Two new members were elected, Mr. Oscar Krause, 349 Seventh Avenue, New York City, and Dr. Vincent Baudendistel, Taurus P. O., West New York, N. J.

The first paper, by Dr. John K. Small, on North American Genera of the Cassiaceae, will soon appear in print.

Discussion followed regarding *Poinceana*, participated in by Dr. Britton, Dr. Underwood and Dr. Small.

The second paper by Dr. Arthur Hollick on the Flora of Provincetown, Mass., was accompanied by a series of maps, charts, views, and dried specimens. Dr. Hollick discussed the relation of this flora to the local geology, and remarked of Cape Cod that the older part from the Highlands of Truro southward consists of glacial drift; the recent part, through Provincetown to the north and west, consists of drifted sands, all postglacial, derived from the older portion and due to the general trend of the tides and currents northward. The result is to form a line of shoals along the coast now united into an outer beach; the space between this and the shore is now filling in and becoming swamp, and a new outer line of shoals is already forming.

Nothing larger now grows on the sand-dunes than small stunted pines and oaks; but Bradford's account indicates that in 1620 it was covered with large deciduous trees. Acts to prevent further cutting of timber were passed in 1720 and later. At present, the town of Provincetown, to prevent further loosening of the sand, forbids passing out of certain beaten paths in the wooded district. Hundreds of acres have been replanted by the state, the lands of Provincetown having been successively reserved as common property of the colony, province and state. It is only within a few years that the land in actual occupation in and near the town has been granted by the state to the occupants.

In reclaiming the sands, *Ammophila* or beach grass has been planted first, then bayberry, then *Pinus rigida*, the native pine of the region. Sand-loving species have since become well-established as an undergrowth, but the new growth shows no signs of ever equaling the original. The same is true on Block Island, where the original forest had become established while the island was connected with the mainland.

The sand flora is remarkable for the great areas closely covered with *Arctostaphylos Uva-Ursi;* this with *Rubus hispidus* and some plants of *Corema Conradii* is the chief means of forming the sand into turf.

The species collected in Provincetown numbered 94, among which *Corema Conradii* seems not to have been recorded from that town since Thoreau's visit in 1849.

The third paper was a note by Dr. A. P. Anderson on *Pachyma Cocos*—the Tuckahoe or Indian Bread. A specimen was exhibited, a mass about two feet long, made up of apparently annual sections indicating ten years' growth. Similar specimens have been found in the South along roots of oak and other trees, usually about two feet below the surface, obtained chiefly when clearing land of old stumps. Undoubtedly a fungus growth, and probably a sclerotium, it has never been seen to produce spores. The whole substance consists of a septated mycelium with abundance of white pectose. A species probably the same occurs in Europe; another in China has been used there for many centuries in medicine. Experiments by Dr. Anderson showed that portions separated from the roots of the host-plant were alive in the soil after a half year. Where the cortex of the *Pachyma* was removed it was renewed.

Rev. L. H. Lighthipe followed with a communication regarding Mr. C. L. Pollard's new species of violet—*Viola Angellae.* He exhibited a water color drawing showing the spring and summer forms of the plant. An excursion for its collection in Orange Mountains was suggested.

EDWARD S. BURGESS,
Secretary.

TUESDAY, MARCH 11, 1902

The meeting was held at the College of Pharmacy; 20 present; Dr. Britton in the chair.

Three new members were elected: Miss Nina L. Marshall, Miss Ely's School, Riverside Drive, N. Y.; Miss Palmyre C. Clarke, N. Y. Botanical Garden; Miss Lillie Angell, 19 Minton Place, Orange, N. J.

Seven resignations were accepted.

Professor Underwood reported a reply from the Syracuse Botanical Club indicating that the members would probably coöperate in the proposed July 4th excursion.

The first paper, by Edward S. Burgess, was on "Plant Illustration in the Middle Ages," being a portion of a contribution to the history of early botany soon to be printed among his Aster Studies. It was illustrated by examples from his library of early woodcuts intended to represent *Aster*, dated 1485, 1499, etc. (long anterior to the first adequate drawing of *Aster Amellus* L., that of Fuchs in 1542); and also examples of the value once put upon the vellum for manuscripts, showing an Italian manuscript dating perhaps from before 1200, in which torn vellum had been carefully mended before writing. He also exhibited a series of heliotypes, representing about 25 pages of unpublished mediaeval manuscript containing drawings of plants, and nearly as many pages more of decorated text; photographed by Professor Giacosa, of Turin, to accompany his recent edition of certain of the Salernitan masters (*Magistri Salernitani*, Turin, 1901). Early plant figures long made it their one aim to show the outline. Chief attention was given to leaves, stem and branches. Flowers were less often and less successfully indicated. The characteristic *habit* of a plant, however, was often caught very perfectly. Figures were copied often with scrupulous care from one manuscript to another. Several causes tended, however, to their degeneration. Pliny charges the blame for the imperfect plant-figures of his time upon lack of skill of copyists. Some of the worst among later errors were those of copyists who were attempting copies of plants they had never seen; as in early

Anglo-Saxon figures of *Aster* and other classic plants. In other copyists a desire for balance and symmetry overcame their fidelity to the original, so that they conventionalized their plants; as seen strongly in later Italian work exhibited, developed in the 14th century from the Salernitan school; and as retained in early printing, Italian woodcuts of 1499 inheriting the same tendency. A fourth source of error in plant-figures was the mediaeval love of the marvelous, so that many copyists outdid their text in depicting fictitious monstrosities; as in the 15th century pictures of mandrakes, Tartarian lamb, etc.

Some of the earliest plant-figures of which we know were those made by Cratevas, a Greek physician to Mithridates, about 100 B. C. Something of their character and form probably still survives to us in certain illustrated manuscripts of Dioscorides, of the fifth century, with figures evidently copied not from each other, but from an earlier common source. There is great need in the interests of the history of botany, that the project of publishing the figures of the Anician Vienna codex, now laid aside for nearly two centuries, should be revived and carried to successful issue.

In the discussion following this paper, Dr. Britton, Dr. Underwood, Professor Lloyd and Mr. Eugene Smith participated.

The second paper was by Mr. W. A. Cannon, entitled "Observations on the Structure of the ovular Integuments of *Dichelostemma capitatum*."

It was stated that the entire inner cell-wall of the outer integument and, also, the basal portion of the inner wall of the inner integument were cuticularized, and colored figures were shown, indicating the final resorption of the inner integument by the developing endosperm. The haustoria of the mistletoe penetrate the oak cortex by secreting a ferment which dissolves the neighboring cell-walls; excepting certain lignified cells which may become incorporated in the haustoria. So also in this liliaceous plant, better known to many as *Brodiaea*, the enzyme of the developing endosperm is unable to dissolve the cuticularized membrane of the integuments, a fact which appears to limit the extension of the endosperm.

Professor Lloyd in discussion suggested that different parts of the ovule may be able to secrete different kinds of enzymes, ready to attack different kinds of tissue simultaneously; at least three different enzymes have been obtained by mechanical means from the yeast-plant. In certain of the Rubiaceae, the formation of enzymes in the megaspore antedates fertilization ; and that the pollen-tube develops an enzyme is well known.

The final contribution of the evening was by Dr. N. L. Britton, on the morphology of the flower of *Dichondra*, a plant commonly assigned to the Convolvulaceae. A specimen is now in full blossom under glass at the Botanical Garden, and its little rotate flowers which resemble those of a saxifrage are highly incongruous with those of the Convolvulaceae.

EDWARD S. BURGESS,
Secretary.

NEWS ITEMS

Professor Charles R. Barnes, of the University of Chicago, sailed from New York for Europe on March 22. He plans to be abroad for about nine months.

Professor F. S. Earle left New York on March 24 to spend two months in the mountains of New Mexico and western Texas, making collections for the New York Botanical Garden.

Mr. R. M. Harper has been appointed temporary aid in the herbarium of the U. S. National Museum. After a month he will proceed to Georgia to continue his field work on the flora of that state.

The moss collections of the late Mr. David A. Burnett, of Bradford, Pa., have been purchased by Mrs. Annie Morrill Smith, and presented to the museum of the Brooklyn Institute of Arts and Sciences.

Dr. D. T. MacDougal returned to New York on March 13 from a six weeks' visit to Arizona and the State of Sonora, Mexico, bringing back several large living specimens of *Cereus giganteus* and other living plants peculiar to that region for the conservatories of the New York Botanical Garden.

We learn from the *Stanford Alumnus* that Dr. Edwin Bingham Copeland, recently professor of botany in the West Virginia University, has been appointed instructor in botany in the Leland Stanford Junior University. Dr. Copeland, who is now engaged in research work at the University of Chicago, will begin his new duties in September.

The February number of the *American Naturalist* contains an interesting illustrated article by Mr. Ralph E. Gibbs on "*Phyllospadix* as a Beach-Builder." The fruit of this "eel-grass" of the Pacific coast has a curious device for attachment by means of which it anchors itself firmly to various species of the jointed coralline seaweeds.

A suggestive discussion of the affinities of certain anomalous genera commonly referred to the dicotyledons, begun by H. L. Lyon in a paper on the embryogeny of *Nelumbo*, published in the Minnesota Botanical Studies, has been continued by D. H. Campbell in the *American Naturalist* for January and by H. S. Conard in *Science* of February 21.

Publication 19 of the Botanical Society of America has recently been distributed. It includes a report of the seventh annual meeting held at Denver, August 27 and 28, 1901, and the annual list of officers, members, associates and patrons. The associates who were elected members at the last meeting were Hermann von Schrenk and Albert Fred Woods. The following accepted election as associates: Henry Chandler Cowles, David Griffiths, Duncan Starr Johnson, Thomas Henry Kearney, William Ashbrook Kellerman, George Thomas Moore, Roscoe Pound, Per Axel Rydberg and Jared Gage Smith.

In the announcement for the thirteenth season of the Biological Laboratory of the Brooklyn Institute of Arts and Sciences, located at Cold Spring Harbor, Long Island, the following items of botanical interest are noted. Professor D. S. Johnson, of Johns Hopkins University, is to be in charge of cryptogamic botany; Nelson F. Davis, Sc. M., of Bucknell University, in charge of bacteriology; S. M. Coulter, of Washington University, in charge of phanerogamic botany; Roy S. Richardson, High School, Brooklyn, in charge of nature study; Louise Brisbin

Dunn, A.M., of Columbia University, assistant in ecology; A. F. Blakeslee, A.M., of Harvard University, assistant in botany. Copies of the announcement may be obtained by addressing Professor Franklin W. Hooper, 502 Fulton St., Brooklyn, or the Director of the Laboratory, Dr. Charles B. Davenport, University of Chicago, Chicago, Ill.

The program of the spring lectures offered to the public by the New York Botanical Garden on Saturday afternoons is for this year as follows:

April 19th, "The Maples and other early-flowering Trees"; by Cornelius Van Brunt; April 26th, "Plant Life in the Sea," by Dr. Marshall A. Howe; May 3d, "Botanical Features of Porto Rico," by Prof. L. M. Underwood; May 10th, "Some Examples of Botany in its Relation to Geology," by Dr. Arthur Hollick; May 17th, "Wild Flowers, the Necessity for their Preservation," by Mr. Cornelius Van Brunt; May 24th, "The Cottons," by Dr. H. H. Rusby; May 31st, "Cactuses and Cactus-like Plants," by Dr. N. L. Britton; June 7th, "Favorite Flowers of Nations and Poets," by Professor E. S. Burgess; June 14th, "The Vegetation of American Deserts," by Dr. D. T. MacDougal.

The lectures will be illustrated by lantern-slides and otherwise, and will be delivered in the lecture hall of the Museum Building of the Garden, Bronx Park, at 4.30 o'clock. They will close in time for auditors to take the 5.42 train from the Bronx Park railway station, arriving at the Grand Central Station at 6.10.

The prizes from the income of the Olivia and Caroline Phelps Stokes Fund offered last January by the New York Botanical Garden for the best essays on the preservation of native plants have been awarded. The first prize, fifty dollars, was won by Dr. F. H. Knowlton, Washington, D. C.; the second, thirty dollars, by Miss Cora H. Clarke, Boston; the third, twenty dollars, by Dr. A. J. Grout, Brooklyn. The prize essays are being published in the current numbers of the *Journal of the New York Botanical Garden*.

Vol. 2 No. 5

TORREYA

May, 1902

THE ORIGIN OF SPECIES BY MUTATION*

By D. T. MacDougal

The period which has elapsed since the presentation by Darwin and Wallace of the theory of the origin of species by natural selection has been most fruitful in the development of speculations as to the factors of evolution and the methods of inheritance and descent. The diversity of the evidence to be considered in connection with any phase of the subject is enormously great, and the majority of biologists interested in the subject have become engrossed in the argumentative presentation of the particular group of opinions to which they give a more or less prejudiced and partisan adherence after the manner of a debating society. During this period the investigators who most rationally held to the attitude that the methods of the origin of species were to be discovered by an examination of living forms themselves gave their attention to the comparative study of related forms or to tracing the phylogenetic phenomena displayed in the embryonic and juvenile stages of the organism.

Within the last decade the conviction has been growing among both botanists and zoölogists that polemics, the array of recapitulative facts offered by the organism in its younger stages, or the facts of comparative anatomy might not offer any convincing evidence of the manner by which the different species actually have arisen, although the results of these studies have been of enormous value in relation to other problems of biology.

In these latter days the tendency has become marked to rely more and more upon results obtained by experimental methods

* Given before the weekly Convention, N. Y. Botanical Garden, April 16 and 23, 1902.

[The exact date of publication of each issue of Torreya is given in the succeeding number. Vol. 2, No. 4, comprising pages 49–64, was issued April 12, 1902.]

of research: instead of attempting to find an answer ready made for our questions we propound our question and set living things in action and seek our reply in their behavior under conditions which we may vary to suit our interrogation. It is obvious that the only way in which we may determine the method of origin of new species is to observe the formation of a species. The recent work of de Vries dealing with this subject is a record of the notable attempt made by him to obtain information upon the subject in this manner.*

De Vries' observations extend over seventeen years and the first volume of the great book in which his work is described deals with the origin of species by mutation, while the second now in preparation gives consideration solely to the subject of hybrids. According to de Vries species may arise by the following general modes:

1. Progressive species-formation by the construction or acquisition of new qualities.

2. Species-formation without the construction of new qualities, in which three cases may be distinguished.

A. Retrogressive species-formation by the lapse or latency of existing qualities, partly atavistic.

B. Digressive species-formation by the awakening or energizing of latent characters, partly in the formation of anomalous structures and partly in atavistic phenomena.

C. Hybridization.

De Vries assumes that any group of individuals which are independent, self-perpetuating and sufficiently distinct by taxonomic characters to meet the requirements of systematic botany constitutes a species irrespective of origin, and in the consideration of his results the importance of his conclusions is not lessened materially whether the forms with which he has dealt are considered as species or varieties so long as they are shown to consist of distinct and independent individuals capable of transmitting certain characters which are assumed to be constant within the limits of ordinary fluctuating variation.

* De Vries, H. Die Mutationstheorie. Versuche und Beobachtungen über die Entstehung von Arten im Pflanzenreich. I. Die Entstehung der Arten durch Mutation. xii + 648 pp. *Pl. 1–8 + f. 1–181.* 1901.

It is needless to say that it would be difficult to undertake any experimental investigations involving the consideration of the status of species without running counter to the convictions and prejudices of a considerable number of systematists. Indeed, but few botanists are prepared to assign specific rank to any individual or group of individuals which have been observed to descend from a group of forms constituting a separate species. A somewhat more considerable number accept self-perpetuating hybrids as species, although it is doubtful whether this attitude may become universal. To this greater majority of systematists then the entire matter of origin of species by sports, single variations, or by mutation is entirely out of court. Single variations or sports are known to occur, however, and new species have suddenly appeared in many well-authenticated instances as the records of the last two hundred years show, and the possibility that many of the commonest forms around us may have originated in this very manner should make even the rashest thoughtful and willing to give the evidence an impartial examination.

It will be of interest to recall the origin of *Chelidonium laciniatum* and *Capsella Heegeri* Solms in this connection, the history of which began nearly three hundred years apart. Sprenger, an apothecary in Heidelberg, discovered in his medicinal garden in which *Chelidonium majus* was cultivated a new form of *Chelidonium* with divided leaves and laciniate petals. Specimens were submitted to a number of botanists at that time to whom it was unknown. The new species was found to be self-sustaining and in repeated cultural tests has shown no tendency to revert to *C. majus*. Furthermore, during the next three centuries it has never been seen except in gardens or in localities where it had clearly escaped from cultivation. Evidence of such conclusiveness would be held worth a human life in criminal proceedings in a court of law. A new species of *Capsella* was found by Professor Heeger at Landau in 1897 which apparently arose from a culture of *Capsella Bursa-pastoris*. This species was so distinct as to be assigned to the genus *Camelina* upon a first examination by Solms-Laubach.* Later, however, its true position was found.

* Solms-Laubach. Crucifereenstudien. Bot. Zeitung, 58 : 167. 1900.

This species has not been found in any collection of herbarium specimens and has not been reported from any other locality. The possibility is not absolutely excluded that the species may not be an old one, or may indeed be a hybrid between *Capsella* and another genus, yet so skilful an observer as Solms is disposed to believe it a new species originating by recent mutation from *C. Bursa-pastoris.* It has been found constant in its characters and self-sustaining so far. Numerous other instances of accidental observation might be cited but it will be profitable to pass at once to the cultural experiments of de Vries.

(*To be continued.*)

THE ACAULESCENT VIOLETS OF CENTRAL NEW YORK

By Homer D. House

Viola palmata L. Sp. Pl. 933. 1753.

V. palmata var. a. *vulgaris* Ell. Bot. S. C. & Ga. **1**: 300. 1817.

V. palmata var. b. *fragrans* Ell. *l. c.*

V. cucullata var. *palmata* A. Gray, Man. 28. 1867 [ed. 5].

Not common in central New York. The entire-leaved forms are some seasons more abundant than the forms with palmately divided leaves. The two forms are always found associated in this region. The entire-leaved variety I shall designate as :

Viola palmata asarifolia (Pursh).

V. asarifolia Pursh, Fl. Am. Sept. 732. 1814.

V. palmata sororia Pollard, Bot. Gaz. **26**: 332. 1898. Not *V. sororia* Willd. Hort. Berol. 1. *pl.* 72. 1806. Perhaps *V. sororia* Willd. Enum. 263. 1809, and of Le Conte, Schweinitz, Nuttall, etc.

Mr. C. L. Pollard refers the entire-leaved forms of *Viola palmata* to Willdenow's *V. sororia.* I am not familiar with the reference Mr. Pollard gives to Willdenow's *sororia,* viz., Enum. 263. 1809. I am, however, familiar with his use of the name in

his Hortus Berolensis, 1 : *pl. 72.* 1806, and excepting the flowers, which are poorly figured, both the description and figure represent a violet perfectly distinct and not to be confused with any entire-leaved *palmata*. The entire-leaved variety of *V. palmata* is distinguished from the next by its more erect and stiffer habit, leaves ovate to hastate-reniform with nearly truncate bases, and rather short deflexed cleistogenes.

VIOLA SORORIA Willd. Hort. Berol. 1 : *pl. 72.* 1806. Not Enum. 263. 1809. Not Pursh nor LeConte.

V. villosa var. *cordifolia* Nutt. Gen. 1 : 148. 1818.

V. cordifolia Schweinitz, Sill. Journ. 5 : 62. 1822.

V. nodosa Greene, Pittonia, 4 : 296. 1901. In part.

A very common violet in central New York, preferring rather dry but rich soil in woods or upland meadows, common along shady roadsides. It bears no resemblance to any entire-leaved forms of *palmata*. Willdenow does not state that his type was from Pennsylvania ; but if it was, which is very probable, it must have come from Muhlenberg, his correspondent there. At any rate, the species seems to have been familiar to the early botanists of Pennsylvania. Darlington describes it in his Flora Cestrica, 144. 1837, and adds the observation, " Leaves 1–2 inches long, mostly orbicular and subreniform, sometimes cordate and rather acute, sprinkled with rigid hairs, especially on the upper surface," etc. In the herbarium of the New York Botanical Garden is a specimen labeled by Darlington " *V. sororia*," which agrees with specimens of my gathering in central New York. In the same place are specimens labeled as follows :

" *V. sororia* Willd. (*V. villosa* Walt. β *cordifolia* Nutt.) Unio itiner, in civitate Ohio, 1837, FRANK."

These specimens also agree with the central New York plant, and Dr. Britton tells me that with Mr. Bicknell, he has often collected this violet in Pennsylvania and is inclined to believe that it is Willdenow's *sororia*. It is evident, then, that the name *sororia* is to be connected with a plant of smaller size than *V. palmata* with more lax appearance of foliage, more softly pubescent leaves of softer and thinner texture. The leaves are never hastate reniform in shape, but have almost always a deep sinus or are at

least cordate with margins crenate or crenate-serrate. Cleistogamous flowers on simply horizontal peduncles.

VIOLA CUCULLATA Ait. Hort. Kew. 316. *pl. 12.* 1789.

V. palmata var. *cucullata* A. Gray, Bot. Gaz. **11** : 254. 1886.

The common "bog-meadow" violet of this region, with pale green foliage, cucullate leaves, and slender cleistogamous flowers on slender, erect peduncles.

VIOLA PAPILIONACEA Pursh, Fl. Am. **1**: 173. 1814.

V. obliqua Britton & Brown, Ill. Fl. **2** : 447. 1897. Not Hill, Hort. Kew. 316. *pl. 12.* 1769.

V. communis Pollard, Bot. Gaz. **26** : 326. 1898.

A violet of moist or low meadows and shady situations about dwellings; not rare, but until recently confused with *V. obliqua* and *V. cucullata.*

VIOLA OBLIQUA Hill, Hort. Kew. 316. *pl. 12.* 1769. Not *V. obliqua* Britton & Brown, Ill. Fl. **2** : 447. 1897.

V. affinis LeConte, Ann. N. Y. Lyc. **2**: 138. 1828.

Not a rare violet in swamps and wet meadows. The description in Britton's Manual of the Northern States and Canada applies well to the central New York form.

VIOLA CRENULATA Greene, Pittonia, **4**: 295. 1901.

A small, tufted, bog-meadow violet with small crenate, glabrous leaves on short petioles; flowering scapes greatly exceeding the leaves, the flowers pale-violet. Resembling *V. cucullata* in its foliage and habitat, but differing from it in its tufted appearance and cleistogamous flowers on very short deflexed or at least horizontal peduncles.

VIOLA ODORATA L. Sp. Pl. 934. 1753.

Introduced and rather common.

VIOLA ROTUNDIFOLIA Michx. Fl. Bor. Am. **2**: 150. 1803.

Not common in central New York. I have collected specimens in Herkimer county and have seen specimens collected in Madison county. Reported from the vicinity of Syracuse.

VIOLA SELKIRKII Pursh; Goldie, Edinb. Phil. Journ. **6** : 324. 1822.

Locally abundant in Herkimer, Oneida, Madison and Onon-

daga counties. Preferring mossy rocks in damp, shady ravines.

VIOLA BLANDA Willd. Hort. Berol. *pl. 24.* 1806.

VIOLA LECONTEANA Don, Gen. Syst. **1**: 324. 1831. Britton, Man. 1049. 1901.

V. amoena LeConte, Ann. N. Y. Lyc. **2**: 144. 1825. Not *V. amoena* T. F. Forst.; Symons, Syn. 198. 1798.

V. blanda var. *palustriformis* A. Gray, Bot. Gaz. **11**: 255. 1886.

V. blanda amoena (LeConte) B.S.P. Prel. Cat. Anth. and Pterid. 6. 1888.

Viola alsophila Greene, Pittonia, **4**: 7. 1899.

Rarely found in Herkimer county. Long Branch, Onondaga county.

VIOLA RENIFOLIA A. Gray, Proc. Am. Acad. **8**: 288. 1870.

V. blanda renifolia A. Gray, Bot. Gaz. **11**: 255. 1886.

VIOLA LANCEOLATA L. Sp. Pl. 934. 1753.

Only a few specimens of *V. lanceolata* have been collected along the edge of a swamp near Syracuse, and so far as I know this is the only record of its being found in this region.

SYRACUSE, N. Y., March 1, 1902.

DESCRIPTION OF A NEW FOSSIL SPECIES OF CHARA

BY F. H. KNOWLTON

Some weeks ago, by the kindness of Professor T. D. A. Cockerell, of East Las Vegas, New Mexico, I was informed that certain fluviatile deposits of Pleistocene age exposed in that vicinity contained great numbers of *Chara* "fruits." A few days since I received from Miss Ada Springer, a student of Professor Cockerell's, a box containing a considerable quantity of this material. Accompanying it was a short description of the "fruits" and a drawing which is the basis of the one here presented.

As this species proves to be wholly unlike any fossil species previously described from this country I venture to describe it as new under the name :

Chara Springeræ

Fruit (sporostegium) elliptical-ovoid in shape, with rather broad point of attachment, and obtuse apex, nearly twice as long as broad (0.65 ± mm. × 0 40 mm.); number of spirals as observed in side view 12 or 13; cells even or somewhat furrowed, obscurely punctate.

The "fruits" are present in considerable numbers, but they are very fragile and difficult to remove. For this reason it is hard to measure them with any degree of accuracy, but approximately they are 0.65 to 0.70 mm. in long, and about 0.40 mm. in short, diameter.

This form is separated at once from *Chara compressa* Knowlton* by its shape, and from *C. Stantoni* Knowlton † by its size, shape and the character and direction of the spirals.

The exact locality whence these specimens came is Arroyo Pecos, Las Vegas, New Mexico. The beds contain other fragmentary plant remains as well as a number of interesting animal remains. Professor Cockerell has kindly supplied me with the following section of the Pleistocene beds at this locality:

Upper Zone.	Coarse Sand.	Land shells only, mostly Pupidæ.
Middle or Charcoal Zone.		2 or 3 distinct layers of charcoal or charred wood, with some not much charred (*Pinus?*). Great quantities of fresh water shells, especially *Physa humosa* and *Sphaerium magnum*. Various bones, including *Equus* with teeth agreeing with *E. Scottii* Gidley.
Lower or Clay Zone.	Clay.	Clay with *Chara* in great abundance. Leaves of *Salix?* *Pyramidula Hemphilli* var. is very common. Fresh water shells of several species not *Sphaerium magnum*.

Professor Cockerell also sent me a number of fragments of wood and leaves, but the latter are so small and so poorly preserved that it was not possible to make them out. It was suggested that they belong to *Salix* and it is not improbable that they should be so referred. No sections of the twigs were made, but they are evidently coniferous, and may well have belonged to *Pinus*.

U. S. National Museum, February 25, 1902.

* Bot. Gaz. 13: 156.

† Op. cit. 18: 141.

A KEY TO THE NORTH AMERICAN GENERA AND SPECIES OF THE HYGROPHOREAE.—II

By F. S. Earle

D. Key to the North American Species of Hygrophorus

Pileus firm, moist, not viscid; lamellae distant, arcuate. Section Camarophyllus.
Pileus fragile, thin, viscid, rarely floccose, often bright-colored; lamellae soft. Section Hygrocybe.

Section Camarophyllus.

1. Lamellae long-decurrent.	2.
Lamellae ventricose, sinuate-arcuate or adnate.	6.
2. Pileus white.	3.
Pileus grayish-brown.	5.
3. Cespitose; stipe short, solid.	*H. stenophyllus* Mont.
Scattered; stipe stuffed or hollow.	4.
4. Stipe 5 cm. long; odor none.	*H. borealis* Pk.
Stipe shorter, 2–2.5 cm. long; odor like anise.	*H. pusillus* Pk.
5. Stipe white; lamellae darker with age.	*H. albipes* Pk.
Stipe brownish; lamellae white; pileus dark.	*H. nigridius* Pk.
6. Pileus pale lilac, grayish-white when dry.	*H. pallidus* Pk.
Pileus whitish, tinged with reddish-brown.	*H. sphaerosporus* Pk.

Section Hygrocybe

1. Lamellae decurrent, or sinuate with a decurrent tooth.	2.
Lamellae adnexed or somewhat free.	10.
2. Pileus pure white.	*H. purus* Pk.
Pileus yellow.	3.
Pileus orange.	5.
Pileus some shade of red.	7.
Pileus grayish brown.	*H. amygdalinus* Pk.
3. Pileus small, 6–8 mm.	*H. parvulus* Pk.
Pileus larger, 1–3 cm.	4.
4. Pileus convex, umbilicate.	*H. nitidus* B. & C.
Pileus convex to plane, obtuse.	*H. ceraceus* (Wulf.) Fr.
5. Pileus glabrous.	*H. aurantiaco-luteus* B. & C.
Pileus squamulose.	6.
6. Lamellae decurrent, distant.	*H. c ntharellus* Schw.
Lamellae sinuate-decurrent, somewhat crowded.	*H. squamulosus* E. & E.
7. Pileus small, 1 cm. or less.	8.
Pileus larger, more than 1 cm.	9.

8. Pileus light red, becoming paler; lamellae whitish but tinted. *H. minutulus* Pk.
Pileus sordid red, often spotted; lamellae shining red. *H. congelatus* Pk.

9. Pileus rose color. *H. cantharellus roseus* Pk.
Pileus shining red becoming yellowish; lamellae white. *H. speciosus* Pk.
Pileus cinnabar red; lamellae and stipe cinnabar. *H. cinnabarinus* Schw.

10. Pileus some shade of yellow or orange (not red). 11.
Pileus some shade of red (sometimes becoming yellowish). 12.
Pileus green. *H. psittacinus* Fr.
Pileus some shade of brown. 14.

11. Pileus golden yellow; lamellae yellow, the margins orange or purplish. *H. marginatus* Pk.
Pileus yellow with purplish disc; lamellae rose-color or brown. *H. Ohiensis* Mont.
Pileus orange; lamellae paler. *H. Ravenelii* B. & C.

12. Pileus blood red; lamellae yellow; stipe red, thin, pallid. *H. haematocephalus* B. & C.
Pileus red (sometimes yellowish). 13.

13. Pileus convex, obtuse, not blackening. *H. chlorophanus* Fr.
Pileus conical, acute, blackening when wet. *H. conicus* (Scop.) Fr.
Pileus campanulate, cuspidate. *H. cuspidatus* Pk.

14. Pileus gray, brown-spotted, lamellae white. *H. variolosus* Fr.
Pileus greenish or yellowish-brown, lamellae white or yellow. *H. immutabilis* Pk.

NEW YORK BOTANICAL GARDEN.

SHORTER NOTES

A SEA-BEACH HELIANTHUS FROM FLORIDA. — During the summers of 1896 and 1897, the Rev. L. H. Lighthipe collected specimens of an exceptionally succulent sunflower on the coast near San Pablo, east of Jacksonville, Florida. The plant has the floral characters of the genus *Helianthus*, but differs from all our previously known species in habit, especially in the fleshy tissues and the almost glabrous involucral bracts:

Helianthus carnosus.—Perennial, essentially glabrous, fleshy. Stem solitary, erect from a slightly inclined base, 3–7 dm. tall, simple: basal leaves with linear or oblong-linear blades 7–15 cm. long, these often accompanied by several shorter and relatively broader ones; stem-leaves mainly alternate, the lower two or four opposite by pairs, the succeeding ones narrowly linear, all entire, sessile: flower-head solitary: outer bracts of

the involucre ovate, 7–10 mm. long, acute or slightly acuminate, sparingly ciliate especially below the middle, inner bracts 10–12 mm. long, contracted below the middle, ciliate above, slenderly acuminate: disk yellow: flowers numerous: bractlets 8–10 mm. long, acuminate: corolla 6–7 mm. long; lobes ovate: achenes slightly angled, 3–3.5 mm. long: pappus-scales lanceolate, longer than the achene.

In sand, San Pablo, Duval county, Florida.

Helianthus heterophyllus seems to be the nearest relative of *H. carnosus*, but the former species has firm tissues, broader basal leaves and is rigidly pubescent to the flower-head, including the narrower involucral bracts.

The type specimen, collected by Mr. Lighthipe July 27, 1897, no. 320, is in the herbarium of the New York Botanical Garden.

J. K. SMALL.

NEW YORK BOTANICAL GARDEN.

VIOLA RENIFOLIA IN THE PENNSYLVANIAN ALLEGHANIES.—On July 18, 1901, I collected a specimen of *Viola renifolia* Gray on the damp rocky slopes bordering the headwaters of Loyalsock Creek at Shady Nook, Sullivan County, Pa., at an elevation of about 2100 feet. This region is notable for the large percentage of truly Canadian species of both plants and animals, so that the occurrence is by no means unexpected. As it has never been recorded from further south than New York, however, it seems desirable to call attention to this station.

WITMER STONE.

ACADEMY OF NATURAL SCIENCES, PHILADELPHIA.

THE NAME OF A WESTERN AQUILEGIA.—*Aquilegia Eastwoodiae* Rydb. Bull. Torrey Club, **29**: 146. 1902, is the *A. micrantha Mancosana* Eastw. Proc. Cal. Acad. Sci. III. **1**: 77. 1897, and if it is treated as a species, must be called **Aquilegia Mancosana**.

T. D. A. COCKERELL.

EAST LAS VEGAS, NEW MEXICO.

PROCEEDINGS OF THE CLUB

Wednesday, March 26, 1902

The meeting was held at the Botanical Garden; Dr. M. A. Howe in the chair, twenty-one persons present.

One election to active membership was made, that of Mr. Ivar Tidestrom, 129 East 24th Street, N. Y.

The first paper was by Dr. L. M. Underwood, entitled "Notes on *Goniopteris*." Distinguishing features of allied genera, found in the venation and in the form of the indusium, were illustrated by figures. Nine species were mentioned, chiefly of the West Indies; including *G. reptans* and *G. tetragona* of Florida, and species recently collected in Porto Rico and in St. Kitts.

The second paper was by Dr. M. A. Howe, under the title of "Notes on the Marine Flora of Nova Scotia and Newfoundland." Numerous examples were exhibited, illustrating especially the larger Phaeosporeae, including large rolls of dried *Laminaria*, rock-specimens bearing crustaceous species, and many others preserved in jars or by mounting on sheets. Among noteworthy species or forms found were *Fucus serratus* and a *Stypocaulon* at Pictou, this being the first collection of the genus *Stypocaulon* in North America. Examples were shown of *Laminaria longicruris* and *L. platymeris* from the Newfoundland coast, whence De la Pylaie first described them. Interesting specimens of *Agarum*, *Alaria*, *Porphyra*, *Gloiosiphonia*, etc., were exhibited; the *Agarum* from a deep tide-pool near Digby covered by 30 feet of water at high tide. Corallines attain great beauty in these northern waters, and with the attendant brown rockweeds and lustrous kelps lend great richness and diversity of color. The dulse gatherers were found to distinguish and prefer the dulse growing on *Laminaria* to that attached to rocks. Dulse gathering in some parts of Nova Scotia forms a business of considerable importance; the dried dulse is put up in barrels to be sold in Boston and latterly in New York.

A third communication by Dr. MacDougal consisted of the exhibition and discussion of a specimen of *Ephedra*, one of two species collected by him in his recent trip to Arizona. This re-

markable leafless relative of the conifers produces palisade cells along its stems instead of leaves. A cutting about three feet high was shown resembling Scotch-broom in its multitude of long green and brown branches.

Dr. MacDougal also exhibited a remarkable Sonoran plant, perhaps an *Ipomoea*, with large swollen discoid base about 15 inches in diameter to which short roots were still attached. He also collected there the tree-Ipomoea known as the *Palo Blanco*, on which deer browse; it bears a few flowers all the year round but the leaves disappear after the rainy season.

EDWARD S. BURGESS,
Secretary.

TUESDAY, APRIL 8, 1902

The meeting of April 8 failed on account of a storm of unusual severity, only one person besides the secretary being present.

E. S. BURGESS,
Secretary.

PROGRAM OF FIELD DAYS OF THE TORREY BOTANICAL CLUB, SEASON OF 1902

May 3.—Hudson Heights, N. J. Leave foot of Christopher Street at 2 p. m. At Hoboken take trolley to end of line. Excursion fare, 16 cents. Guide, Mr. Eugene Smith.

May 10.—Orange Mountain. Take Christopher Street Ferry to Hoboken, then the 12.50 train to Orange. Returning, leave Orange at 5.09 or 5.48 p. m. Excursion fare, 50 cents. Guide, Miss Angell, who will meet party at Orange.

May 17.—Arlington, Staten Island. Leave by Staten Island Ferry at 1.30 p. m. Excursion fare, 20 cents. Guide, Mr. Wm. T. Davis.

May 24.—Central Park, Long Island. Leave Long Island City at 11.10 a. m. Excursion fare, $1.25. Guide, Mr. McCallum.

Decoration Day Trip.—May 29, 30, etc. Port Jervis, N. Y. Leave foot of West 23d Street, by Erie Railroad on Thursday,

May 29 or forenoon of Friday, May 30. The Friday morning train will be met at the Port Jervis Station. Trains leave at 4.45 p. m., arriving at 7.31, or at 6.25 or 7.25 p. m.; the 9.10 a. m. train arrives at 12.05. Returning as desired. Excursion fare, $2.50. Guide, Dr. Britton.

June 7.—Rye, N. Y. Leave Grand Central Station, N. Y. N. H. & H. R. R. at 1 p. m. Returning, leave Rye at 6.30 p. m. Excursion fare, $1.00. Guide, Dr. Schoeney.

June 14.—South Orange, N. J. Leave by Christopher Street Ferry at 12.30 p. m. Returning, leave South Orange at 5.02 p. m. Excursion fare, about 60 cents. Guide, Mr. Manda.

June 21.—Moonachie, N. J. Leave by Christopher Street Ferry at 1.00 p. m. Take Rutherford trolley to Lieve's Road-House. Fare, 20 cents. Guide, Mr. Nash.

June 28.—Great Notch, N. J. Leave by Chambers Street Ferry at 1.30 p. m. Excursion fare, 75 cents. Guide, Mr. Kato.

Fourth of July Trip.—July 3–5. Syracuse, N. Y. In connection with the Syracuse Botanical Club. Visits will be made to the Jamesville Green Lakes, one of the few stations for the harts' tongue fern, and to other interesting localities in the vicinity. The D. L. & W. Railroad offers round trip rates to Syracuse at $11.00. Further details will be given in Torreya for June. Guide, Professor Underwood.

July 12.—Aqueduct, Long Island. Leave foot of East 34th Street at 1 p. m. Excursion fare, 50 cents. Guide, Mr. McCallum.

July 19.—Maplewood, N. J. Leave by Christopher Street Ferry at 12.50 p. m. Excursion fare, 65 cents. Guide, Mr. W. A. Smith.

July 26.—Dunwoodie, N. Y. Leave 155th Street and Eighth Avenue terminus of Sixth Avenue Elevated Road, at 1.35 p. m. Excursion fare, 40 cents. Guide, Miss Sanial.

August 2.—Great Island, N. J. Leave foot of Liberty Street at 1 p. m. for Elizabethport; change to train on Newark and Elizabethport Branch which will stop at Great Island. Buy ticket at New York for Elizabethport and at Elizabethport for Newark. Excursion fare, 60 cents. Guide, Dr. Rusby.

August 9.—Central Park, New York City. Meet at 106th Street and Fifth Avenue at 2 p. m. Guide, Dr. Schoeney.

August 16.—Grasmere, Staten Island. Leave foot of Whitehall Street at 1.30 p. m. Excursion fare, 20 cents. Guide, Miss Lawall.

August 23.—Fort Lee and Englewood, N. J. Leave by Fort Lee Ferry at 1.30 p. m. Excursion fare, 30 cents. Guide, Dr. Hommel.

August 30.—New York Botanical Garden. Leave Grand Central Station at 1.30 p. m. Guide will meet party at Bronx Park Station.

September 6.—Pelhamville, N. Y. Leave Grand Central Station at 1.30 p. m. Excursion fare, 60 cents. Guide, Mr. Ericson.

September 13.—Richmond, Staten Island. Leave foot of Whitehall Street by ferry at 1.30 p. m. Take Midland trolley to Richmond. Excursion fare, 20 cents. Guide, Miss Motts.

September 20.—Rockaway Park, Long Island. Leave Brooklyn Bridge at 1 p. m. Excursion fare, 30 cents. Guide, Mr. McCallum.

September 27.—Moonachie, N. J. Leave foot of Christopher Street by ferry at 1 p. m. Take Rutherford trolley to Lieve's Road-House. Excursion fare, 20 cents. Guide, Mr. Eugene Smith.

October 4.—Plainfield, N. J. Leave foot of Liberty Street by ferry at 10 a. m. Excursion fare, $1.10. Guide, Miss Noll.

NEWS ITEMS

F. V. Coville, N. L. Britton, Gifford Pinchot, and J. M. Macfarlane have been appointed advisers in botany for the Carnegie Institution.

Mr. G. V. Nash, head gardener of the New York Botanical Garden, is in Europe for the purpose of visiting and studying some of the botanical gardens of England and the Continent.

Miss Julia T. Emerson, who has been carrying on special mycological studies at the New York Botanical Garden, has been

appointed a temporary assistant in the botanical department of Purdue University.

An expedition under the leadership of Mr. O. F. Cook, of the United States Department of Agriculture, has recently visited Guatemala with the special aim of gathering information in regard to the rubber industry.

"A Monograph on any genus or group of Thallophytes" is a subject for which the Boston Society of Natural History offers one of its Walker Prizes for the year 1903. The prize offered for the best memoir is sixty dollars, though this may be increased to one hundred dollars for a memoir of marked merit at the discretion of the committee. A second prize not exceeding fifty dollars may also be awarded. Memoirs submitted in competition must be in the hands of the secretary of the Society on or before April 1, 1903.

Dr. Oliver R. Willis died on April 27th at his home in White Plains, N. Y., aged eighty-seven years. Most of Dr. Willis's life was devoted to teaching, and he was well known as the editor and reviser of Alphonso Wood's widely used botanical text-books. He was the author, also, of a "Catalogue of Plants growing without Cultivation in the State of New Jersey," a "Report of the Flora of Westchester County" [New York], and of "A Practical Flora for Schools and Colleges." Dr. Willis was one of the earlier members of the Torrey Botanical Club.

A private letter brings news of the death of George S. Jenman, F.L.S., who was doubtless the best informed of any person in the world in regard to the field study of the ferns of British tropical America. From 1873–1879 he was Superintendent of the Botanical Garden at Castleton, Jamaica, and since 1879 he had been Government Botanist of British Guiana and Superintendent of the Botanical Garden at Georgetown. Mr. Jenman described many new ferns, mostly in the *Gardener's Chronicle* and the *Journal of Botany*, and between 1890 and 1898 published a synoptical list of the ferns of Jamaica with full descriptions. He began also a conspectus of the ferns and fern-allies of the British West Indies and Guiana, of which five parts had been issued at the time of his death.

Vol. 2 No. 6

TORREYA

June, 1902

THE ORIGIN OF SPECIES BY MUTATION*

BY D. T. MACDOUGAL

As a result of previous studies, de Vries was led to believe that species with a tendency to form monstrosities would be most likely to offer opportunities for securing evidence of the origin of new species by mutations or discontinuous variations. A thorough inspection of promising forms around Amsterdam in Holland was begun in 1886 and carried on for several years, during which period more than a hundred species were brought under cultivation, only one of which was found useful for observations upon mutations.

The plant in question—*Onagra biennis* (L.) Scop. [*Oenothera Lamarckiana*]—had escaped from cultivation in this locality in 1875 and was represented by several hundred examples in an old potato field. The rapid multiplication of the individuals had been accompanied by many divergences from typical forms inclusive of ascidia and fasciations, and while many were annuals, others were clearly biennial and a few were triennials. In 1887, a number of individuals representing two forms so distinct from *O. biennis* as to constitute new elementary species were found in the multitude of individuals which were examined. The exact origin of the new types, which were named *Oenothera brevistylis* and *Oe. laevifolia*, could not of course be determined, but both were found to be constant from seeds; furthermore, no examples of similar forms could be found in the principal herbaria. The occurrence of the two forms in question was not conclusive evidence in itself but they served to bring the interest and enthu-

* Continued from page 68.

[The exact date of publication of each issue of TORREYA is given in the succeeding number. Vol. 2, No. 5, comprising pages 65–80, was issued May 14, 1902.]

siasm of the investigator to the highest pitch and induced him to plan a series of observations lasting through the following fourteen years, which entailed an enormous amount of tedious mechanical work.

The experimental investigations which followed were organized with an attention to detail that left nothing to chance and reduced the sources of error to a minimum. Without recounting all of the various features of the technique employed it will suffice to say that most rigid methods of isolation of specimens and regulation of pollination were used, a fact that adds much value to the results which were achieved.

The culture of the main species was carried through successive seasons from absolutely pure crops of seeds, and the derivative forms were cared for in the same manner. *Onagra biennis* was found to be in a state of mutation and to reproduce every year of the experimental tests a number of forms which might be designated as constituting new species. Nine species were thus found to spring from *O. biennis*, being designated as *gigas*, *albida*, *oblonga*, *rubrinervis*, *nanella*, *lata*, *scintillans*, *elliptica*, *leptocarpa*, *brevistylis* and *laevifolia*. Mutants or derived species also were found to be in a state of mutation to some extent, and *laevifolia* gave rise to *spathulata* in addition to some of the forms derived from the parent type. *O. lata* in a similar manner gave rise to *sublinearis* and *subovata* in addition to some of the forms also derived from the parent type. The following table will

A Group of Derivatives from *O. biennis*

Generation.		Name of Species							
		gigas.	*albida.*	*oblonga.*	*rubrinervis.*	*biennis.*	*nanella.*	*lata.*	*scintillans.*
VIII.	1899		5	1	0	1700	21		
VII.	1898			9	0	3000	11		
VI.	1897		11	29	3	1800	9	5	1
V.	1896		25	135	20	8000	49	142	6
IV.	1895	1	15	176	8	14000	60	73	1
III.	1890–91				1	10000	3	3	
II.	1888–89					15000	5	5	
I.	1886–87					9			

illustrate the frequence and manner of occurrence of the mutants derived from pure seed cultures of *Onagra biennis* (*Oenothera Lamarckiana*) in a series extending from 1886 to 1899.

In the genealogical table shown above, seeds from the nine specimens of the first generation produced 15,000 of the parent type, 5 of *nanella* and 5 of *lata*. Seeds from some of the 15,000 produced a crop consisting of 10,000 *biennis*, 3 *nanella*, 3 *lata* and 1 *rubrinervis*. The succeeding generations were obtained in the same manner.

It is to be seen from the above table that in the series of cultures outlined above, embracing seven generations of seedlings, about 800 of the 50,000, or a little more than 1.5% of the entire number, were mutants or forms sufficiently divergent from the normal to be designated as new species. The parent type produced some of the new species every year it was under observation but by no means in the same proportion or profuseness, and it seems very probable that no plant will exhibit the tendency to produce mutants in greater degree than the one which has been selected for these notable experiments. It is also to be noted that the new species have by no means the strength and general virility of the parent type, and that the few individuals representing some of the new species in any community would have but little chance of survival in the struggle for existence with the thousands of their fellows of the parent type. When isolated, however, and relieved from the fiercer competition met under natural conditions, the majority were independent constant types. *O. scintillans*, *O. sublinearis* and *O. elliptica* were classed by de Vries as inconstant forms, while *O. lata* is sterile so far as the examples yet examined show.

A discussion of the facts given above could hardly be made without calling up the question at once as to the systematic value of the forms designated as species. The new species which suddenly originate do not differ so widely as an apple from a pear, or as a pine from a spruce; only in a few of the species are their general features strikingly divergent from the parent type. Yet a careful examination will show that differences are present and important, relating to size and aspect of the shoot, shape,

color and surfaces of the leaves, and size and form of the fruits. Some of the new species are separable in the seedling stage when three or four leaves have been formed, the rosette presenting a characteristic picture. De Vries suggests that the mutants or species derived by mutations in his experiments are quite as clearly separable as the species recognized in the currently accepted classifications of the oaks, hieraciums, or cochlearias.

(*To be continued.*)

OUR YELLOW LADY'S-SLIPPERS

By P. A. Rydberg

Some time ago I received a letter from Mr. Oakes Ames, of North Easton, Mass., which contained, among other matters, the following lines: "While looking over your revision of the Orchidaceae in Dr. Britton's 'Flora of the Northern States and Canada' (1901), I noticed that your key for the genus *Cypripedium* gives as a characteristic of *C. pubescens* (*hirsutum*) a pale yellow lip, flattened vertically, and as a characteristic of *Cypripedium parviflorum*, a bright yellow lip, flattened laterally. Have you found in working up your material that the case is reversed after all, and that Hooker, Gray and others were confused in their ideas?"

Although I revised the manuscript of the Orchidaceae for Dr. Britton's Manual, I did not find anything in the treatment of *Cypripedium* that I thought needed a change, but left that genus practically as Dr. Britton had it in the "Illustrated Flora." I added in this case the differences in the flattening of the lip, which character had been used here at the Garden. My understanding of the two species was, however, the same as that of Dr. Britton and I had no idea that Hooker, Gray or others had any other understanding. I thought, therefore, that the difference between the characteristics given by them and by us was more apparent than real and that it depended upon a different interpretation of terms. I, therefore, wrote to Mr. Ames, explaining my use of the words "vertically" and "laterally" flattened. By *vertically flattened*, I mean such a flattening as would be produced by a pressure from *above* and *below*, the

greatest expansion, therefore, being lateral, and by a *lateral* flattening I mean such a flattening as would be produced by a *lateral* pressure, the greatest expansion being vertical. I also remarked that one of the most prominent of the American botanists now living understands by these terms exactly the reverse.

From another letter from Mr. Ames I find that he has interpreted the terms in the meaning in which Dr. Britton and I used them. A little closer study of Hooker's and Gray's descriptions made me see that Mr. Ames was correct in claiming that they understood the two species differently from us. Where is the trouble? As the results of my attempts to answer this question may be of general interest, I give them to the readers of TORREYA, hoping that they will kindly help in throwing light upon certain unknown facts concerning the yellow lady's-slippers.

The large yellow lady's-slipper, *Cypripedium hirsutum* of the Illustrated Flora and Britton's Manual, I have seen twice in the living state, once many years ago in Michigan and once in New York. As I know it, the lip is low and broad, *i. e.*, flattened vertically. *Cypripedium pubescens* was described by Willdenow in his Species Plantarum, **4**: 143. 1805. He afterward published an excellent figure in his Hortus Berolinensis, **1** : *pl. 13*. This figure shows the low and broad lip, and shows that it is the same as the plant described in Britton's Manual as *Cypripedium hirsutum* Mill. Miller has no plate, but there is no doubt in my mind that his *Cypripedium hirsutum* is the same as Willdenow's *C. pubescens*. Of the latter there is also a fine illustration in Barton's Flora, **3**: *pl. 74*. This also shows the broad lip. The figure published in Sweet's English Flower Garden, *pl. 71*, does not belong to this species, but to what I have regarded as *Cypripedium parviflorum*.

The specimens of *C. hirsutum* or *C. pubescens* in our herbaria apparently all have a broad lip, so far as one can judge from pressed specimens.

The small yellow lady's-slipper I have not seen in the living state in the east; but the plant that has gone under that name in the Black Hills of South Dakota and in the Rocky Mountains is well known to me. In this the lip is taller and narrower, *i. e.*,

somewhat compressed laterally. In all eastern specimens with small flowers in our herbaria, except one from Wisconsin, the lip seems to be like those from the Rocky Mountain region. The first plate I turned to of *C. parviflorum* was that in Curtis's Botanical Magazine, **23**: *pl. 911*. This has the narrow high lip characteristic of the plant that I have held as *C. parviflorum* and which was published under that name in Britton's Manual. Turning to the Kew Index, I find that this plate is referred by Mr. Jackson to *C. pubescens*. It is evidently the same as *C. pubescens* of Sweet's English Flower Garden, mentioned above, but surely not the same as that of Willdenow's Hortus Berolinensis, which must be regarded as authentic. The same plant is also figured in Redouté's Les Liliacées, **1**: *pl. 20*. 1802, under the name of *C. flavescens*.

So far my interpretations seemed to have been correct, but now comes the trouble. I turned to the original publication of *C. parviflorum* Salisb. in the Transactions of the Linnean Society, **1**: 77. Salisbury has there a figure of the flower with a very broad and low lip, closely resembling Willdenow's figure of *C. pubescens*. *C. parviflorum* is compared with *C. Calceolus* of Europe and described and figured as having much smaller flowers than that species. It may be remarked that *C. Calceolus* scarcely has as large flowers as our *C. pubescens* and consequently the true *C. parviflorum* should not have larger flowers than *C. passerinum* of the far north and much smaller flowers than either of the two yellow lady's-slippers known by me.

The result of my investigations are in short as follows:

1. That *C. hirsutum* Mill. (*C. pubescens* Willd.) has been rightly understood by Dr. Britton and me, and wrongly so by the English botanists and by Gray.

2. That either do we have three species of yellow lady's-slippers, one large and one small-flowered, both with vertically flattened lip, and a third medium-sized one with laterally flattened lip; or else was *C. parviflorum* Salisb. a small-flowered form of *C. hirsutum*.

3. In either case, the one with laterally flattened lip is neither *C. pubescens* nor *C. parviflorum*.

4. If there are three species their names and synonyms would be as follows:

C. HIRSUTUM Mill. Gard. Dict. ed. 8. no. 3. 1768 (also of Britton's Manual); *C. pubescens* Willd. Sp. Pl. **4**: 143. 1805; Hortus Berolinensis, **1**: *pl. 13*; Barton's Flora, **3**: *pl. 74*.

C. FLAVESCENS Redouté, Lil. **1**: *pl. 20*. 1802; *C. parviflorum* Sims, Bot. Mag. **23**: 911. 1806 (also of Britton's Manual); *C. pubescens* Sweet, Engl. Flower Garden, **1**: *pl. 71*. 1823 (also of Gray's Manual).

C. PARVIFLORUM Salisb. Trans. Linn. Soc. **1**: 77. *pl. 2. f. 2*. 1791 (probably also of Gray's Manual).

As I have never seen the small yellow lady's-slipper of the east in the living state and do not know the form of its lip I ask the readers of TORREYA kindly to communicate to me any facts they may have and to watch our cypripediums during the coming seasons that the difficulty may be cleared. I would also be very thankful if I could get fresh material (especially flowers) of either of the species.

N. Y. BOTANICAL GARDEN.

THE BRACKET FUNGI

BY L. M. UNDERWOOD

At every season of the year numerous tough, woody, or leathery fungi will be found shelving out from stumps, fallen logs, tree trunks, or railroad ties. Most of these are plants belonging to the Agaricales and may represent any one of four families according as they bear on their under side lamellae, pores, spines, or merely smooth surfaces. Essentially they are formed alike, with the spore-bearing surfaces looking downward and with a roof or pileus formed of interlacing mycelium more or less compacted and sometimes hardened into a thick crust. One of the commonest in late spring or early summer is *Favolus*, with pores angular like honeycomb, a small round or reniform plant more commonly growing from hickory limbs though often on other species of wood. This is the only species of its genus

in the northern states. The species of *Polyporus* with small round pores are more numerous; some are confined to special kinds of wood while others do not seem to show any preference for the substratum on which they grow. Thus a species which has passed as *Polyporus lucidus*, but which is a wholly different species, grows only on the hemlock, and its polished surface looking as though smeared with shellac renders it very easy to distinguish. *P. betulinus*, with shapely form and pure white context, is confined to the white birch and is very abundant wherever its host is found. *P. rimosus*, with a cracked and fissured pileus, is common on the black locust (*Robinia*) from New York City to central Indiana and southward. In the fall the common willow (*Salix alba*) bears a rather fragrant species of a genus too closely allied to *Polyporus*, *Trametes suaveolens*. All these species and many others are confined to single kinds of trees and can readily be known by their peculiar habitat. Other genera of the pore-bearing fungi are also confined to single species of trees. Almost every old chestnut stump in the vicinity of New York City is more or less covered with the pilei of *Daedalea quercina*, with its thick corky texture and its coarse labyrinthine pores which almost form a link to lamellae. True lamellae are found in *Lenzites*, of which the common species with a brown context (*Lenzites sepiaria*) is confined to the wood of coniferous trees, while the common species with a white context (*Lenzites betulina*) is more widely distributed on the wood of deciduous trees and is everywhere common, its velvety pileus often covered with a growth of green algae.

Certain of the species of *Polyporus* are annual, forming a single layer of pores, though some of these occasionally build out a new mycelial surface beyond the borders of the old growth. Among these, three species are everywhere common, and all of them present themselves under a variety of forms. *Polyporus pergamenus*, with lacerate porès and thin pilei often tinted beautifully with purple when young, is the most widespread species, often covering the whole surface of a standing tree trunk or a recently fallen dead log. *P. versicolor*, still more protean in character, may be recognized by its thin context, white pores and

zonate pileus of varying but often bright tints. *P. hirsutus* may be known by its obtuse-walled dissepiments between the pores and its densely velvety pileus. These with *Daedalea unicolor*, with a similar but less hairy pileus, represent some of our most common species. Other species form successive layers of pores, often growing continuously for many years and sending out a new spore-bearing layer each year. These have been placed in the genus *Fomes* but this generic concept like the more embracing one, *Polyporus*, represents a conglomeration of generic types which careful study of our forms will some day enable us to separate and distinguish.

Among these, one of the most widely distributed is *P. leucophaeus*, which has long masqueraded in this country under an incorrect name as *P. applanatus;* this species does not seem to select the wood of any special tree for its substratum. Another species with layered pores very common on the yellow birch and the beech is the plant known as *Polyporus fomentarius*, although the exact limitation of this species is not yet clear. Another species common on trees of several species, especially in the Adirondacks, is *P. igniarius*, a black crustaceous species often reaching considerable size and an immense age as indicated by the number of layers.

We have a few species that are edible when in a young and cheesy condition. Among these is the brilliant-colored *P. sulfureus*, with its brilliant sulphur-yellow pores and its pretty pink-tinted pilei overlapping but connected at the base and often forming masses of many pounds' weight. Another common compound species is *P. frondosus*, which usually grows with us attached to the buried roots of old oaks.

We have also a few species with central stems. Among these the largest is *P. picipes*, recognized by its black-footed stem and red-brown pileus, often growing several together. A smaller species with a similar black foot, but with a pale yellowish-white pileus is *P. elegans*. A third wood-inhabiting species with a central pileus is found in late spring or early summer growing on all sorts of wood; this has a hairy fringe to its pileus and is known as *P. arcularius*. This species becomes rare northward, but has

been found as far northward as central New York. A late fall species (*P. brumalis*) with a dark brown pileus is more common northward than otherwise. All the above grow on wood. Other species grow on the ground like the brilliant brown somewhat shiny species which Professor Peck called *P. splendens*; this grows by the side of wood-roads quite commonly both north and south.

These are but a few of the common species that one is likely to meet in the woodland where there is more or less fallen timber. The species of bracket fungi are easy to collect and are readily preserved, the greatest trouble being from the fungus-eating beetles they often contain, but these can usually be destroyed by dipping the fungus into either benzene or gasolene, without injuring the specimen. In collecting, the habitat and host should be indicated and care should be taken to secure representative specimens which will clearly indicate habit of growth; if possible, plenty of them should be secured for study of variation. They can best be preserved in pasteboard boxes of assorted sizes, and while they form a bulky collection, they form an interesting one, and are usually more satisfactory for study than a collection of the fleshy agarics, however well preserved.

SHORTER NOTES

An Interesting Irregularity in a Rose Flower.—Cultivated roses very frequently show various kinds of abnormalities, such as the development of sepals, or still more leaf-like organs where petals are usually to be expected, and other equally surprising occurrences. The case before us is one of these abnormal conditions which, though often observed, is of interest since it appears to offer pretty clear evidence as to the nature of the "hip" in the rose.

The case before us is the following: The specimen is a bud in which there are the usual five sepals, four of which are in normal position. The fifth, however, is inserted on a lower level on the surface of the calyx cup. The cup is, however, completely

formed *up to the level* of the bases of the remaining sepals. If now the rose "hip" is to be regarded as resulting from the concrescence of the sepals—in other words a calyx-tube—we would expect a hiatus in its side from the base of the oddly placed sepal upwards, which precisely does not occur. It would, however, not be impossible for the tissue from the sides of the hiatus to extend across the space and, by coalescing, obliterate it. We would then expect to find some evidence of disturbances in the direction of growth in the arrangement of the tissues, but this we do not find to be the case.

Regarding the hip as a receptacle (or torus)—that is, a vase-shaped expansion of the end of the axis—we would expect that under some conditions the sepals might appear at any point on its surface, and that the receptacle would be completely closed at the same time. This is the condition here found.

The condition above described appears to have the same morphological significance as that occasionally seen in the apple, in which a leaf or a very much shortened shoot, looking like a potato "eye," is sometimes found on the side of the fruit. Such a case as the former is mentioned by Bailey in his book, "Lessons With Plants" (p. 289). An apple with a shortened axis borne on its side was shown at a meeting of the Torrey Club some time ago.

FRANCIS E. LLOYD.

NOTES ON A LONG ISLAND MOSS.—In the April number of TORREYA on page 50, in his Additions to the recorded Flora of Long Island, Dr. Grout listed *Raphidostegium admistum* (Sulliv.) as if it were a new combination. This had been published by Kindberg in the Bryineae of Europe and North America (**1**: 64. 1897) as *R. admixtum* and specimens had been distributed in 1900 by Heller in his Plants of Porto Rico, nos. 4350 and 4496 as *R. admixtum* (Sulliv.) Ren. and Cardot. Dr. Grout has sent us specimens from Jamaica (Long Island) which have been compared with Wright's Cuban mosses no. 121—the co-type of *Hypnum admistum* Sulliv. The Long Island specimens are not referable to this species, but to *H. micans* Sw.

E. G. BRITTON.

PROCEEDINGS OF THE CLUB

Wednesday, April 30, 1902

The meeting was held at the Botanical Garden at 3:30 P. M.; 27 persons present; Rev. L. H. Lighthipe in the chair.

There were four elections to active membership: Mr. Elmer C. Hazard, Shrewsbury, N. J.; Mr. Ewen McIntyre, 303 West 74th St., New York; Professor Henrietta E. Hooker, Mt. Holyoke College, South Hadley, Mass.; and Miss Fannie F. Rabinowich, 22 Attorney St., New York.

Dr. Britton spoke of Dr. Oliver Willis's recent death and the following committee was appointed to draw up resolutions: Dr. Britton, President Brown and Dr. Rusby.

The first paper by Dr. C. C. Curtis, was on "Some Features connected with Transpiration." Transpiration may be illustrated by a fluctuating curve. The maximum of the curve is found in the forenoon. Transpiration can hardly be considered to be wholly a physical property. The volume of water given off by plants in the night is very considerable, and probably the stomata are never completely closed. It seems perfectly rational that the stomata are open, partly, in the dark and that some transpiration takes place. During the early morning hours, the amount of water given off is much more than in the afternoon, when the stomata have become accustomed to the light.

The second paper announced was by Dr. H. H. Rusby, on "A new Genus of Violaceae, with Remarks on other Genera." This was deferred on account of absence of the author.

The third paper, by Dr. H. M. Richards, was on "Turgor Changes in injured Tissues." It has been shown that the curve of respiration in injured plant tissues rises for a time and then falls off to the normal. The "wound fever," or rise-in-temperature curve is similar to that of respiration. Turgor changes apparently accompany these reactions towards injury. The onion was used for experiment, and the wounded and uninjured bulbs were placed in a saturated atmosphere. The normal turgor pressure in terms of KNO_3 solution is about 3.5 to 4%; after wounding this falls about 0.5%. As the healing goes on,

four or five days after the wounding, the turgor has increased again and the wounded and unwounded onions are practically the same in this respect. Carrot, beet and radish were also used.

Dr. MacDougal showed plants of *Monotropsis odorata* sent by Professor Johnson, of Johns Hopkins University. He also showed a basket made by the Pima Indians of Arizona, of *Typha*, *Martynia* and *Salix*, and exhibited the *ayal* or calabash fruit from Sonora, of economic importance, of genus *Crescentia*.

Miss Angell, of Plainfield, New Jersey, exhibited living plants of *Viola Angellae* in flower. When the plant is flowering the scapes exceed the leaves, but later in the season the leaves overtop the scapes.

S. H. Burnham,
Secretary pro tem.

Fourth of July Excursion of the Club

The Fourth of July excursion of the Torrey Club promises to be one of exceeding interest and profit. The main excursion will be to the Jamesville "green lakes," which are among the few stations of the hart's-tongue fern in America. It is planned to leave by carryalls from the postoffice at Syracuse at nine o'clock on the Fourth making an all-day trip in conjunction with the Syracuse Botanical Club. It is planned to visit both the green lakes and one or two interesting glens in the neighborhood. The green lakes are small ponds in the bottom of amphitheater-like hollows two hundred feet or more deep and said by the geologists to be the heads of ancient waterfalls. The lakes are very deep, and filled with cold water more or less impregnated with sulphur. The surrounding rock is of the corniferous and Helderberg limestone which overlie the Salina (salt) formation. Probably as large a variety of ferns grows about these lakes as in any limited area anywhere in the country, and mosses, fungi, lichens, and flowering plants grow in great profusion. On Saturday the fifth of July the club will visit the saline vegetation on the shores of Onondaga Lake, leaving the city by trolley cars. It is hoped that later excursions will be possible at the Kirkville green lakes and possibly Sylvan Beach on Oneida Lake. It is desirable that all who intend going with

the excursion notify the leader, L. M. Underwood, at Columbia University, as early as possible in order that proper accommodations may be provided.

NEWS ITEMS

Dr. B. M. Duggar, of the Bureau of Plant Industry, U. S. Department of Agriculture, has been elected professor of botany in the University of Missouri.

Professor Francis E. Lloyd lectured before the Biological Club of Princeton University, May 15, on "The Behavior of the Pollen-Tube in Spermatophytes."

Professor F. S. Earle returned to New York on May 27 from a collecting trip of two months, mostly spent in the Davis Mountains of western Texas and the Sacramento Mountains of eastern New Mexico.

Dr. W. A. Cannon, recently fellow in botany in Columbia University, will spend the summer in western North Carolina. A part of his time will be devoted to making collections for the New York Botanical Garden.

The eleventh session of the Hopkins Seaside Laboratory at Pacific Grove, California, began on June 9, the regular course of instruction closing July 19. Dr. Anstruther A. Lawson, assistant in botany at the Leland Stanford Junior University, has charge of the botanical courses.

The May number of the *Bulletin of the Torrey Botanical Club* includes three papers of interest to students of the fungi, viz., "The Nidulariaceae of North America" by V. S. White, illustrated by five plates; "Concerning some West American Fungi" by David Griffiths; and the conclusion of "Supplementary Notes on the Erysiphaceae" by E. S. Salmon, F. L. S.

Mr. Cyrus G. Pringle, one of the best known of living botanical collectors, has accepted an appointment as keeper of the herbarium of the University of Vermont, where his personal herbarium is soon to be deposited. The same institution has recently acquired on deposit the herbarium of the late C. C. Frost, which is especially rich in the cryptogamous plants of the Connecticut Valley.

The department of botany of the Marine Biological Laboratory at Woods Holl, Massachusetts, continues under the direction of Dr. Bradley Moore Davis, of the University of Chicago. The session for the summer of 1902 extends from July 2 to August 13. Dr. George T. Moore, Dr. Rodney H. True, Dr. Henry C. Cowles, Dr. Charles H. Shaw, Professor Andrew C. Moore, Mr. James J. Wolfe, and Miss Lillian G. MacRae are the other members of the botanical staff.

The Journal of Mycology, the publication of which was discontinued with volume 7 in 1894, is now revived by Dr. W. A. Kellerman, of the Ohio State University, Columbus, Ohio. This journal was established by Dr. Kellerman and Mr. J. B. Ellis in 1885 and later passed under the control of the Division of Vegetable Pathology of the United States Department of Agriculture, volumes 5–7 being published under the latter management. The journal will now be issued quarterly, the May number beginning volume 8.

The first regular meeting of the New York Naturalists' Club was held at the College of Pharmacy, 115 West 68th Street, on the evening of May 20. A constitution was adopted, and William L. Sherwood was elected president and Percy G. Doane, secretary and treasurer. The Naturalists' Club aims to be more popular and wider in its scope than the other scientific societies and clubs in New York City. At the June meeting a paper will be read upon the nature and classification of living objects, with an endeavor to show some of the relations of the larger groups.

The third annual meeting of the Horticultural Society of New York was held at the New York Botanical Garden on May 14 and 15. An exhibition of plants and cut flowers, with prizes open to all competitors, was a prominent feature of the meeting. Prizes to the amount of $425 were offered by the Botanical Garden and to the amount of $110 by the Horticultural Society. The June meeting of the society is to be held at the Botanical Garden on Wednesday and Thursday, the 11th and 12th, the main feature being an exhibition of roses and other flowering shrubs, peonies, small fruits and vegetables. Prizes

aggregating about $300 are offered. The Council of the Society announces that it has completed arrangements for an International Conference on Planting Breeding and Hybridization to be held in New York, September 30 to October 2, 1902.

"The Wild Flower Preservation Society of America" has recently been organized with the following officers: President, Mr. Frederick V. Coville, United States Department of Agriculture; vice-president, Dr. D. T. MacDougal, New York Botanical Garden; secretary, Mr. Charles Louis Pollard, United States National Museum; treasurer, Mrs. Carolyn W. Harris, 125 St. Marks Avenue, Brooklyn, New York; managers, Dr. L. H. Bailey, Cornell University; Mrs. N. L. Britton, New York Botanical Garden; Miss Alice Eastwood, California Academy of Sciences; Mr. E. L. Morris, Washington, D. C.; Mr. C. D. Beadle, Biltmore Herbarium; Mr. Joseph Crawford, Philadelphia, Pa.; Dr. C. F. Millspaugh, Field Columbian Museum; Mr. A. M. Read, Washington, D. C.; Dr. Charles E. Bessey, University of Nebraska; Mr. Walter Deane, Cambridge, Massachusetts; Dr. F. H. Knowlton, United States Geological Survey; Dr. William Trelease, Missouri Botanical Garden.

The annual dues are one dollar and each member is entitled to receive *The Plant World*, the official organ of the society, without additional charge. Under the auspices of the society a public lecture, illustrated by Van Brunt lantern slides, on "Some Wild Flowers in Need of Preservation" was delivered by Dr. N. L. Britton, May 22, before an audience of seven hundred, in the lecture hall of the U. S. National Museum, Washington, D. C.

Dr. William J. Gies, adjunct professor of physiological chemistry in Columbia University, has been appointed consulting chemist of the New York Botanical Garden.

Vol. 2 No. 7

TORREYA

July, 1902

THE ORIGIN OF SPECIES BY MUTATION*

By D. T. MacDougal

Admitting for the sake of the present discussion the validity of the results obtained by de Vries, the following general laws may be deduced from a consideration of the experimental observations recorded by him :

1. New elementary species may originate suddenly, without transition or intermediate forms between them and their immediate ancestors. The new species actually originate in the formation of the seeds, but are born, figuratively speaking, at the time of the germination of the seeds, and become recognizable in many instances as soon as the earlier leaves have unfolded.

2. The newly arisen species are constant from the moment of their origin, and a species is not to be considered as an arbitrary group but as consisting of a number of individuals conforming, within the limits of the fluctuating variations, to a sharply defined type.

3. The new forms arising in the experimental investigations were sufficiently divergent from the parents to be assigned specific rank, and might not be classed as varieties of the parent types.

4. The characters of the newly derived species show no resemblance to the individual variations exhibited by the parent type, being in fact qualitative rather than quantitative divergences. Special emphasis is to be laid upon this point, from which it would seem that species do not appear by gradual differentiations among plants growing wild in response to environmental stimuli,

* Continued from page 84.

[The exact date of publication of each issue of Torreya is given in the succeeding number. Vol. 2, No. 6, comprising pages 81–96, was issued June 12, 1902.]

but originate suddenly without regard to their fitness for the conditions encountered.

5. As a further development of the last-named idea, the mutations by which new species arise are in themselves purposeless, and may differ from the parent in any particular, or, otherwise stated, mutation may take place in any given direction. Consequently, the greater number of the newly arisen types perish at once because of their pronounced unfitness for the conditions and competitions which they encounter, and do not reach a second generation. The surviving species must not only show a fitness for meeting the encroachments of existing forms, but must be anatomically and physiologically suitable for the environment. The number of mutants of any plant growing in a state of nature would usually be very much less than that obtained in the cultural operations described, by reason of the customary failure of the greater proportion of the crop of seeds to obtain germination conditions. It is of course possible that the exigencies of sudden erosions, or disturbances of the soil over small areas might occasionally furnish similar conditions to those under which *Onagra* mutated so abundantly.

6. The elementary species were found to arise in a number of individuals at the same time. The mutation from a parent type might occur in such manner that the new species would be formed in successive seasons in the same general manner.

7. Mutability occurs only at certain periods, and a species might continue existence indefinitely without giving rise to new forms.

In this last-named conclusion de Vries takes a position long held by Darwin that the variability of a species is independent of its environment and that the strengthening effect of use and weakening effect of disuse are in no wise to be considered as direct agents in the development of forms constituting new species.

The conceptions of de Vries as to the origin of species may be rightly understood only when his analysis of the character or consistency of a species is borne in mind. His interpretations of the facts lead him to the conclusion that the characters of an organism are made up of well-defined and separate units, or ele-

ments, and that these elements are associated in groups; the same elements or groups of elements may, and supposedly do, recur in related species. The origin of a species by mutation would imply the substitution of a new elementary character, or quality, in the combinations, or groups, much after the same manner in which changes in the constitution of chemical bodies are effected.

It is these elementary units or characters which must be considered in the analysis of the qualities of a hybrid, and the proper application of the principles involved will, as de Vries asserts, afford an adequate explanation of the composite nature of hybrids. The forthcoming volume of this author upon the subject will be awaited with the greatest interest by all concerned with questions of descent and heredity.

From the reviews and discussions which have already been made of de Vries' papers it is to be seen that the greatest misunderstanding which may likely arise in the consideration of his results will be that founded on the error of confusing fluctuating variability and mutability. Individual variations, or fluctuating variations, may be caused by altered conditions of nutrition or other environmental factors, and when these conditions are applied and directed in gardening and agricultural operations they may give rise to the so-called improved races. Such variations are exhibited constantly, and in great number, and soon reach a maximum limit in any given direction, or in the development of any single quality, usually within a few generations, and the total departure from the original type is never sufficient to constitute an independent species, or true variety. Mutability on the other hand is a variation implying, and due to, the appearance of new qualities, or the disappearance of existing characters, or the rearrangement of elements, in such manner as to constitute new characters. Mutations are enormously rare in comparison with the fluctuating variations described above, and this very rarity has led to an underestimation of their value in the origin and development of species, according to de Vries' conclusions.

The writer is aware that the foregoing statements may be taken as a somewhat bold setting forth of the mutation theory, but still it is believed that the main contentions of de Vries are rightly

presented. Lack of space prevents a more critical and accurate delineation of the entire matter.

It is notable that a presentation of the importance of mutation or "heterogenesis" as a means of origin of new species has also been made recently by Korschinsky,* based upon historical evidence in which he presents a number of well-authenticated instances of mutations; other aspects of the subject have been brought out by Kölliker and Hartmann.

It will be of interest in this connection to cite a recent summary by von Wettstein of present knowledge of the method of origin of species as based upon information derived from the study of plants. This writer lays emphasis upon the fact that the significance of mutation must not be underestimated, and calls attention to the well-recognized fact that alterations in the elementary qualities of species have been demonstrated to take place only by hybridization and by heterogenesis (mutation). Other methods may exist but they lack the absolute proof which may be found in support of the two named. It is but fair to this writer to say, however, that he does not ascribe the origin of all species to any one cause, and that he lays great stress upon the fixation of adaptive characters, as well as upon hybridization and heterogenesis, as prominent among the factors to which new species owe their origin among plants in a state of nature.†

Since the above discussion was given to my colleagues before the weekly Botanical Convention, Professor de Vries has kindly sent me a supply of seeds of *Onagra biennis* (*Oenothera Lamarckiana*), the parent type used in his experimental cultures and also of five of the newly arisen species, viz: *O. brevistylis*, *O. gigas*, *O. lata*, *O. nanella* and *O. rubrinervis*. These were sown in the propagating houses of the New York Botanical Garden early in May and a fine crop of the different forms is already to be seen. These cultures will be most carefully observed, and the continued behavior of the parent type and derived forms noted, with respect

* Korschinsky, S. Heterogenesis und Evolution. Naturwiss. Wochenschrift, 14: 273. 1899. Also Flora, 89: 240–363. 1900.

† Wettstein, R. von. Der gegenwärtige Stand unserer Kenntnisse betreffend die Neubildung von Formen im Pflanzenreiche. Ber. Deut. Bot. Ges. 18: (184). 1900.

to further mutations, as well as to the constancy of their elementary characters.

NEW YORK BOTANICAL GARDEN.

A KEY TO THE NORTH AMERICAN SPECIES OF RUSSULA.—I

BY F. S. EARLE

The Russulas are among our most abundant and attractive mushrooms. They are common everywhere in woodlands but seldom occur in open fields. The number of species is very great and many of them are conspicuous for their brilliant coloring. Bright reds, yellows, greens and purples are frequent among them, while other species appear in the less striking whites and browns. Many of the species are very hot and peppery to the taste, while a few are acrid or nauseous. This with their brilliant coloring has led to the belief that they are poisonous. In most cases the peppery taste disappears on cooking but in some the disagreeable flavors persist so as to render them unpalatable if not unwholesome. There is no evidence that any of the species are dangerously poisonous, like the deadly Amanitas, and it is probably prudent to eat of any of the species that are not unpalatable.

In studying the Russulas it is important to note carefully the characters of the lamellæ, whether equal or heterophyllous, forked or simple, whether the interspaces are veined or ribbed or smooth, and any changes in color either on maturity or when cut or injured. The taste and odor should also be carefully noted as also the color of the spores, whether white, bright yellow or ochraceous.

The first attempt at bringing together descriptions of our American species was by MacAdam (Journ. Myc. **5**: 58–64, 135–141. 1889). This series of papers was unfortunately discontinued after twenty-five species had been described. McIlvaine and MacAdam (One Thousand American Fungi, 185–213. 1900) give descriptions of forty-five species. Peck in the Reports of the New York State Museum and in botanical journals has de-

scribed as new some twenty-seven species. In the following key a synopsis is given of seventy-seven species and varieties that have been reported from North America. It is probable that some species have been omitted, since the literature has not yet been exhaustively examined, and in some cases species are doubtless referred to the wrong section owing to imperfect descriptions. Any further notes or any corrections will be thankfully received by the writer.

Key to the Sections of the Genus

1. Lamellae equal; pileus with a separable pellicle. Sec. 5, Fragiles.
   Lamellae unequal, heterophyllous; pellicle adnate or none. 2.
2. Margin of pileus conspicuously striate. Sec. 4, Heterophyllae.
   Margin of pileus even, not striate. 3.
3. Pileus dry from the first, cuticle breaking areolately, scaly, pruinose, etc. Sec. 3, Rigidae.
   Pileus moist or viscid, smooth, cuticle not breaking. 4.
4. Lamellae conspicuously forking, slightly heterophyllous. Sec. 2, Furcatae.
   Lamellae conspicuously heterophyllous, seldom forking. Sec. 1, Compactae.

Key to the North American Species

Section 1, Compactae

1. Pileus white or pallid. 2.
   Pileus cream-color or tinted. 3.
   Pileus brown or fuliginous; lamellae darkening or drying. 4.
2. Lamellae distant; stipe 2–6 cm. *R. delica* Fr.
   Lamellae crowded; stipe 1–2 cm. *R. brevipes* Pk.
3. Lamellae and flesh changing to brown when wounded. *R. compacta* Frost.
   Lamellae and flesh unchanging. *R. cremoricolor* Earle.
4. Lamellae and flesh changing to reddish when wounded. *R. nigricans* (Bull.) Fr.
   Lamellae and flesh unchanging. *R. adusta* (Pers.) Fr.

Section 2, Furcatae

1. Pileus white, pallid or slightly tinted. 2.
   Pileus greenish or brownish green or olivaceous. 3.
   Pileus some shade of red, at least when young. 6.
2. Flesh blackening when wounded. *R. sordida* Pk.
   Flesh white, not blackening. *R. basifurcata* Pk.
3. Stipe brighter green than pileus. *R. viridipes* Bann & Pk.
   Stipe white or whitish. 4.

4. Lamellae subdistant, thick.	*R. furcata* (Pers.) Fr.
Lamellae crowded, narrow.	5.
5. Lamellae often forking; pileus yellowish green, acrid.	*R. aeruginascens* Pk.
Lamellae sometimes forking; pileus brownish green, mild.	*R. crustosa* Pk.
Lamellae rarely forking; pileus olivaceous.	*R. olivascens* Fr.
6. Pileus blood red; lamellae crowded, narrow.	*R. sanguinea* Fr.
Pileus lighter, often pallid with age.	7.
7. Lamellae subdistant, broad; taste mild.	*R. subdepallens* Pk.
Lamellae crowded or subcrowded.	8.
8. Taste mild.	*R. depallens* Fr.
Taste acrid.	9.
9. Pileus and lamellae spotted.	*R. sardonia* Fr.
Pileus and lamellae not spotted.	*R. rosacea* Fr.

NEW YORK BOTANICAL GARDEN.

NOTES ON THE LOCAL FLORA

BY EDWARD W. BERRY

While the following list contains no additions to the New Jersey flora, it is believed that the stations are, for the most part, new and worth recording, more especially as the rapid spread of suburban residences and manufacturing establishments in this section of the State is fast obliterating what beautiful bits of watercourse or swampland remain.

Eriophorum gracile Koch. Atlantic*: Hammonton.

Orontium aquaticum L. Passaic: near Passaic. Bergen: near Garfield.

Erythronium albidum Nutt. Bergen: near Garfield.

Salomonia commutata (R. & S.) Britton. Bergen: banks of Passaic River opposite Passaic.

Cypripedium parviflorum Salisb. Passaic: Great Notch. Bergen: Carlton Hill.

Castanea dentata (Marsh.) Borkh. Atlantic: Hammonton.

Aristolochia Serpentaria L. Bergen: near Garfield.

Silene Caroliniana Walt. Passaic: Great Notch.

* The name of the county is placed first, followed by the colon.

Magnolia Virginiana L. Bergen: swamp along Hackensack River.

Trollius laxus Salisb. Passaic: Clifton. Bergen: Garfield, Carlton Hill.

Coptis trifolia (L.) Salisb. Hudson: Secaucus swamps. Bergen: Paramus.

Cimicifuga racemosa (L.) Nutt. Passaic: Passaic, Great Notch, abundant.

Ranunculus delphinifolius Torr. Sussex: Lake Hopatcong. Bergen: Carlton Hill.

Ranunculus obtusiusculus Raf. Bergen: Moonachie.

Ranunculus pusillus Poir. Passaic: Passaic.

Ranunculus sceleratus L. Passaic: Passaic, Clifton. Bergen: Woodridge, Moonachie.

Batrachium trichophyllum (Chaix) Bossch. Passaic: near Passaic, abundant.

Caulophyllum thalictroides (L.) Michx. Sussex: Lake Hopatcong.

Lupinus perennis L. Bergen: near Lodi.

Euonymus Americanus L. Passaic: near Great Notch.

Viola rostrata Pursh. Passaic: Passaic.

Viola lanceolata L. Passaic: Passaic.

Viola primulaefolia L. Bergen: Wallington.

Viola rotundifolia Michx. Passaic: Passaic.

Clethra alnifolia L. Passaic: Passaic, Clifton.

Rhododendron maximum L. Bergen: swamp along Hackensack River, abundant.

Asclepias rubra L. Atlantic: Pleasant Mills.

Utricularia vulgaris L. Atlantic: Hammonton.

Utricularia inflata Walt. Atlantic: Absecon.

Utricularia clandestina Nutt. Atlantic: Hammonton.

Conopholis Americana (L. f.) Wallr. Passaic: Passaic, on white birch.

Valeriana officinalis L. Passaic: along Notch Road.

Adopogon Carolinianum (Walt.) Britt. Passaic: Great Notch.

Tragopogon pratensis L. Passaic: Passaic, abundant.

Tragopogon porrifolius L. Passaic: along road near Great Notch.

Sclerolepis uniflora (Walt.) Porter. Atlantic: near Hammonton.

Willugbaeya scandens (L.) Kuntze. Passaic: near Passaic.

Senecio obovatus Muhl. Sussex: Lake Hopatcong.

PASSAIC, N. J., April 1, 1902.

NOTES ON TWO PARASITIC PLANTS

BY S. B. PARISH

CUSCUTA INDECORA Choisy.—It is stated by Britton and Brown that "indications of a small amount of coloring matter, possibly chlorophyll, have been observed in one species" of *Cuscuta.* To which species they refer I do not know, but I remember such a statement, made some years ago in the *Bulletin of the Torrey Botanical Club*, regarding *C. Gronovii.*

This spring I had the opportunity of observing a considerable number of seedlings of *C. indecora.* The seed must have been aggregated in some way, for the plantlets came up in tufts of twenty or more. They were some two inches in length, and not having found hosts were tangled together. Now what at once attracted the attention was that these tufts showed three distinct bands of color. For their lower third the stems were white and somewhat hyaline, indicating that the cell contents had been mostly absorbed. The next third had a very noticeable tint of light-green, possibly—may one not say probably—indicative of the presence of chlorophyll. The remaining third had the usual yellowish color of the species.

PHORADENDRON FLAVESCENS MACROPHYLLUM Engelm.—The books tell us that birds, eating the fruit of the mistletoe, distribute the seeds by their evacuations. Kerner it is, I think, who adds that as these are watery the heavier seeds are carried down to the under part of the stem of the host, so that the young parasite often makes its appearance in that situation.

These observations are probably true of *Viscum album*, the European mistletoe, but it seems to be different with *Phoradendron*

flavescens, its American analogue, at least here in southern California. Mistletoe is very abundant, and at the proper season one may find seeds glued on branches of trees, on fences and stones, in short, wherever birds alight. I have never seen any that had the appearance of having passed through the digestive tract of a bird. They seemed rather as if left by the bird in cleaning his bill or feet, to which they may have adhered while he was feeding. This is more probable from the fact that seldom do more than two or three seeds appear to have been deposited at one time. Young mistletoes usually, but not always, start from the upper half of the branch on which they grow.

Why *P. flavescens* should be leafy and *P. juniperinum* leafless, has been plausibly explained from the fact that the first species, growing on deciduous trees, needs leaves of its own during the resting period of its host, while the juniper mistletoe needs none since it grows on evergreens. This is a satisfactory explanation, but it evidently needs amendment to make it clear why *P. Bolleanum*, growing on junipers, should be leafy, while *P. Californicum*, which is parasitic on the mesquite and other deciduous hosts, is leafless.

SAN BERNARDINO, CALIFORNIA.

REVIEWS

The Comparative Embryology of the Rubiaceae *

The second part of Professor Lloyd's study has recently appeared and forms a very valuable as well as interesting contribution to our knowledge of the Rubiaceae. In this paper there are studies of the following species: *Callipeltis Cucullaria*, *Sherardia arvensis;* several species of *Galium*, viz., *Aparine*, *recurvum*, *pilosum*, *Mollugo*, *verum*, *triflorum*, *tinctorum* and *Parisiense;* several species of *Asperula—azurea*, *galioides*, *montana*, *setosa*, and *tinctoria;* *Rubia tinctoria;* *Crucianella gilanica*, *C. macrostachya*, *C. herbacea;* *Diodia Virginiana*, and *D. teres;* *Richardsonia pilosa;* and *Houstonia coerulea* and *H. longifolia.*

* Memoirs of the Torrey Botanical Club, 8: 27–112. *pl. 5–15.* 15 F. 1902.

Since it is hardly possible in a short review to present in detail the results of this throughgoing study, I shall summarize only what are apparently the most important conclusions.

In all of the plants studied except *Houstonia* two ovules and one integument are present; *Houstonia* has many ovules and no integument, realizing the "nucellus nudus" of Schleiden. In the Spermacoceae, there is, in addition to the integument, an outgrowth which contains the vascular supply of the ovules and is the seat of a large number of excretory cells. This is termed the strophiole.

The archesporium, except in the Spermacoceae and Oldenlandeae, contains 7–15 macrospore mother-cells, and each macrospore mother-cell divides twice to form four spores, which are physiologically and morphologically equivalent, and any or all of which may undergo one division although the functional embryo-sac is derived from the middlemost of the group. In the Spermacoceae and Oldenlandeae there is but one macrospore mother-cell.

The embryo-sac presents some curious and interesting deviations from the usual conditions that obtain in the higher plants. The embryo-sac either develops where the macrospore is formed (*Houstonia* and *Richardsonia*), or it moves along the micropylar canal, and in extreme cases (as in *Asperula*) the mature embryo-sac may partly protrude from the end of the canal and come to lie between the integument and the pericarp.

As regards the antipodals, although invariably present, they vary greatly both as to function and number. Perhaps the most interesting of the antipodals described are those of *Callipeltis Cucullaria*, of which one is greatly elongated and acts as a haustorium, by the action of which the supernumerary macrospores are destroyed and their contents ingested and made available as food for the developing embryo-sac.

The young embryos of the Galieae are provided with haustorial outgrowths that project laterally from the suspensor. Their function as absorbers ceases as soon as the adjacent endosperm cells become filled with reserve food, and their walls become thickened to form a reserve cellulose.

An account is given (pp. 66–88) of the mitoses of the archesporium and embryo-sac, based mainly on a study of *Asperula montana*, *Crucianella macrostachya* and *C. gilanica*. The embryo-sac mother-cell contains a large number of coarse fibers which persist through the prophases of the first division and are regarded as currents of kinoplasm and not, therefore, as a rearrangement of the reticulum. As in the higher plants, the spindle is of multipolar origin, no centrosomes are present, and the maturation divisions are normal. In *Crucianella* the interesting discovery of ten as the reduced number of chromosomes was made.

The behavior of the pollen tube in *Diodia* and *Richardsonia* is given in much detail. After leaving the pistil the tube may make its way either between and in a direction at right angles to the columnar epidermal cells that are in the neighborhood of the micropyle (*Richardsonia pilosa* and *Diodia teres*), or, it may extend to the surface of the ovule and travel upon it to the micropyle (*Diodia Virginiana*). Professor Lloyd concludes that chemotropism is the important factor in determining the later direction of growth of the pollen tube, that the distribution of the irritant is a differential one, and, finally, he suggests that the synergidae or possibly the ovum may be the source of the stimulant. The pollen tube does not as a rule act unfavorably on the cells with which it comes into contact except in so far as injury may arise from the pressure that it may exert upon them.—W. A. CANNON.

A University Text-book of Botany*

With nearly 400 pages devoted to the botanical system out of a total of 550, the present work would seem to represent a work on systematic botany and it must be interpreted mainly from that standpoint, although it is written by one who has never been classed as a systematic botanist. The work as a text-book must most naturally be compared or contrasted with the most recent emanation from the Germans familiarly known in our laboratories as the "Bonn text-book," for it is evidently this work that the

*A University Text-Book of Botany, by Douglas Houghton Campbell, Ph.D. xv + 579 pp. *Pl. 1–15 + f. 1–493.* New York, Macmillan & Co. (Price, $4.00.)

present volume aspires to replace. The relative space given in the two works to the various major divisions of the subject can be seen by a direct comparison :

	Campbell.	Bonn Text.
Introduction and General Morphology,	65	130
Physiology,	34	124
Botanical System,	395	271
Ecology,	35	
Distribution in time and space,	21	
Total pages,	550	525

Of necessity much of the work is a compilation from many sources but it seems strange that in following the systematic arrangement of Engler and Prantl there has not been more of an attempt to bring that work, which is already comparatively old in parts, at least up to the standard suggested by its own authors, even if the additions made by other workers were not considered. It is inexcusable, for instance, that the complex Helvellaceae should continue to stand next above the simple Exoascaceae, a blunder so patent that the incongruity was pointed out in the German text itself before its completion. Class and ordinal terminology follows a hap-hazard arrangement wholly at variance with the principles enunciated at Berlin itself, and generally accepted wherever the importance of a consistent terminology is recognized. Thus the author accepts Howe's class Anthocerotes as a coördinate group with the Hepaticae, but the name is changed to *class* Anthocerotales, thus improperly using a termination reserved for a group of ordinal rank alone.

The bibliographies at the close of the chapters are curious in their detail, and one is at a loss to know the *motif* in the selection of titles. On the one hand papers of comparative unimportance are freely cited, and on the other standard works are wholly omitted. It is hard to understand why a page should be wasted in a *university* text-book in citing the long list of recent elementary texts in botany both English and American, while among the 365 bibliographic citations from American botany no reference whatever is made to such classics as Torrey and Gray's Flora of North America or Harvey's Nereis. A bibliography of American lichens that omits all reference to the works of Edward Tucker-

man and yet cites Schneider's Guide is, to say the least, strangely askew in botanical perspective. More than once the same work is cited in different places under different titles and throughout there is lack of attention to minor details that distinguish a really valuable bibliography from a random selection of unassorted titles of papers. Accuracy in bibliographic citation is one of the characteristics of recent American botany, but in this work there is a relapse toward English inaccuracy which is far below the American standard.

No less curious are the titles of chapters where logical arrangement would be naturally expected in a systematic work, and where the student needs to have all the mechanical aids that are possible to a clear coördination of the subject. Chapter IV., for instance, is entitled "Classification" and that word occupies the headline of the right-hand page throughout the chapter, but only a page and a quarter of the chapter is devoted to the subject of "classification," where that word also appears as a subtitle or one of the subdivisions of itself, while the bulk of the chapter is devoted to the lowest groups of plants, mainly the schizophytes and the diatoms. Although the author includes both the bryophytes and the pteridophytes under the "Archegoniatae," Chapter VII. alone is headed "Archegoniatae" and treats only of bryophytes, while Chapters VIII. and IX. are headed "Pteridophyta" with no suggestion in the headlines of their relation to any other coördinate division. In a similar way the subtitles are a strange mixture of illogical sequence and lack of proper subordination. For example, in the chapter on the "Angiospermae," three fifths of which is not devoted to that subject but to one of its two divisions, the following subtitles appear in coördinated typography: "The Flower," "The Ovule," "The Antipodal Cells," "Pollination," "The Homologies of the Embryo-sac," "Germination," "The Leaf," "The Floral Leaves," "Structure of the Flower," "Classification of the Angiosperms."

The illustrations are not up to the standard of first-class American laboratories, many of them being sketchy and showing an unfinished appearance. In this field a student should have models set before him in the way of botanical illustration, at least of as

high a grade as would be required in a master's thesis. Some of the illustrations that are apparently redrawn from this and that author are frequently a good way "after" the originals.

The space devoted to certain important subjects like embryology is too meager, at least on its physiological side, and the whole chapter on physiology, besides being out of all proportion to the size of the work in its brevity, in some places becomes a mere catalogue of important topics with striking bold-face headlines and a few words of explanatory matter.

While the work has many good features that will readily commend themselves, it can by no means be taken to represent the standard of American botany of the present day. The subject of botany has become too broad to lie within the grasp of one man, and the ideal university text-book—still a dream of the future—must be the work of many specialists with the whole brought into coördination by one master mind whose botanical perspective is so clear-cut that the real relation of parts will form a consistent and logical whole. Even the phlegmatic Germans have reached this point and have set an example of this sort. It remains for Americans in the future to adopt and perfect the plan.

LUCIEN M. UNDERWOOD.

PROCEEDINGS OF THE CLUB

TUESDAY, MAY 13, 1902

The meeting of May 13 was held at 8 p. m., at the College of Pharmacy; 18 persons present; Dr. H. H. Rusby in the chair.

The secretary reported a request from the Brooklyn Institute to print the Torrey Club's weekly program of excursions on the weekly program-ticket of the Institute. The Club voted its endorsement of this arrangement.

The treasurer asked for the appointment of a committee to report on the price of the Memoirs to members of the Club. As a committee the chair appointed the board of editors and the treasurer.

Dr. Underwood and others discussed the proposed Fourth of July excursion to the lakes near Jamesville, N. Y. With this it

is proposed to combine a visit to the halophytic flora of the Saline Salt Springs.

Two new members were elected: Mr. W. A. Cannon, Columbia University; Mrs. Emily Hitchcock Terry, Hubbard House, Northampton, Mass.

The scientific program was as follows: Margaret Slosson, "A Hybrid between *Asplenium platyneuron* and *Camptosorus rhizophyllus*"; Francis E. Lloyd, "Vivipary in *Podocarpus*" and "A new Method of displaying Herbarium Specimens."

These papers, which were illustrated with numerous drawings and specimens, will soon appear in print.

EDWARD S. BURGESS,
Secretary.

NEWS ITEMS

Mr. G. V. Nash, head gardener of the New York Botanical Garden, returned on June 14 from a visit to some of the botanical gardens of Europe. Arrangements for exchanges of living plants were made with various gardens.

Mr. Joseph E. Kirkwood, instructor in botany in Syracuse University, and Miss Winifred J. Robinson, instructor in Vassar College, are carrying on some special studies at the New York Botanical Garden during the summer vacation.

A prospectus of the new Sharon Biological Observatory at Sharon, Massachusetts, has recently been distributed. The plans of this institution, so far as developed, include the following: "(*A*) A preserve for native trees, wild flowers and other wild plants, and for wild animals such as insectivorous and game birds, rabbits, squirrels, fishes, frogs, etc.; (*B*) opportunities for experimental and field investigation in natural history, biology, etc.; (*C*) summer school of nature studies." The Observatory is at present a private undertaking on the part of the Director, Dr. George W. Field, and others connected with the Massachusetts Institute of Technology. The summer school opens on July 9. The botanical courses offered are under the direction of J. G. Jack, Samuel C. Prescott, and A. B. Seymour.

Vol. 2 No. 8

TORREYA

August, 1902

VIVIPARY IN PODOCARPUS *

BY FRANCIS E. LLOYD

An interesting case of vivipary, one which appears to be more or less widely known, but, nevertheless, unrecorded † is that which occurs in *Podocarpus Makoyi.* It is quite probable that the same thing occurs in some other species of the genus. During the past winter a specimen of this species some four feet in height has produced, in the conservatory of the New York Botanical Garden, an excellent crop of fruits, and these have, almost without exception, germinated, and this on the tree, so that the plant presented, for a greenhouse plant, a very unique and interesting appearance. A shoot, bearing a germinating seed, is shown in Fig. 1.

The ovules of *Podocarpus Makoyi* are produced laterally in the axils of the leaves. They are provided, as are all the Taxaceae, with a fleshy, aril-like organ, dark purple when ripe (*int. 2*, Fig. 2), which is generally regarded as an outer integument. Surmounting this is the glaucous green, oval body, consisting, when young, of nucellus and integument (inner integument, according to the terminology here used, *int. 1*, Fig. 2), which corresponds to the similar body deeply buried in the pit of a *Taxus* fruit. From this, however, it differs in the fact that in *Podocarpus* it comes into an anatropous position. The micropyle is then so placed as to lie against the fleshy outer integument (Fig. 2, *c*).

* Read at a meeting of the Torrey Botanical Club, May 13, 1902.

† I learn from Mr. K. Miyake that the phenomenon is, as would be expected, well known in Japan and has probably been described in Japanese; it has also been observed before in cultivation elsewhere.

[The exact date of publication of each issue of TORREYA is given in the succeeding number. Vol. 2, No. 7, comprising pages 97–112 was issued July 1, 1902.]

When the fruit has arrived at maturity, the embryo (*e*, Fig. 2, *c*) then occupies a cylindrical cavity in the endosperm (*end*, Fig. 2, *c*) which, rich in food materials, occupies the whole space in the interior of the inner integument. The end of the radicle of the embryo then lies close to the micropyle, and it is at this stage in its development that, were it not for the viviparous habit, the seed would enter the resting condition. As it is, however, the embryo keeps up its growth, and very soon the

FIG. 1. A shoot of *Podocarpus Makoyi*, bearing a germinating seed.

root end of the embryo breaks through the micropyle. The relative position of the two regions of the ovule above distinguished, together with the positive geotropy of the root pole of the embryo, causes the radicle, and later the hypocotyl, to bend downwards. How far the geotropic stimulus affects the matter is however not clear, for, either on account of the weak response, or as a result of unequal growth on the two sides of

the hypocotyl, the axis continues its growth in a curve, so that, when the whole of the hypocotyl is exposed, it lies in the arc of a circle, approximately (Fig. 1, *h*; Fig. 2, *a*). The process of curving does not always cease even after the fruit falls from the tree, but continues as the seedlings lie upon the ground until, in many cases, the hypocotyl makes a complete loop. These curvatures are frequently fixed by growth so that in older seedlings the irregularities are still to be seen. The absence of geotropic response may be only apparent, inasmuch as growth is very slow, and the tissues of the exposed axis are rendered cumbersome by the load of food materials.

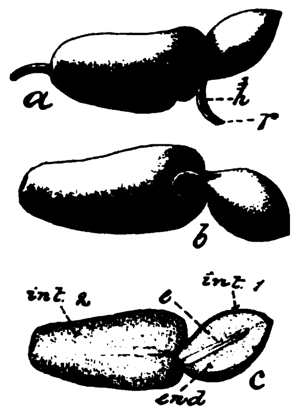


FIG. 2. *a*, lateral view of fruit during early stage of germination; *b*, dorsal view, and *c*, longitudinal section, of same; *e*, embryo, *end*, endosperm; *int. 1*, *int. 2*, inner and outer integuments; *h*, hypocotyl; *r*, radicle.

The hypocotyl is, when developed, of that club shape (Fig. 3) characteristic of certain other viviparous plants, as the mangroves. It is very rich in food materials, especially starch, derived not alone from the endosperm but as a result of its own activity in starch-making. This is evident from the greater weight of the hypocotyl and from its green color. Stomata are present, also, in numbers upon the hypocotyl.

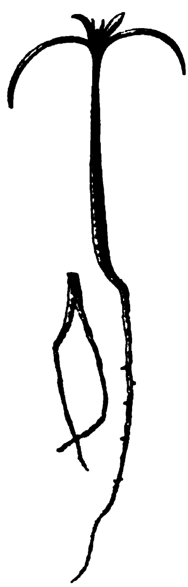


FIG. 3. A seedling, and the lower end of another showing two lateral roots.

Under the cultural conditions in which the plant under discussion was growing, the radicle, which forms but a mere tip of the axis, was frequently found in a withered condition. The primary root of the embryo is, in fact, often destroyed. For this reason, when the embryos, usually together with the other seed-parts, finally become detached from the

tree and become established in the soil, the primary root axis does not, at least in many cases, develop. In its stead, however, one, or usually two, secondary roots (Fig. 3) are formed in the usual manner, *i. e.*, laterally, very close to the end. As a result of the mechanical relations of the tissues, these are from the start forced to grow parallel to the chief axis, and thus take the place of the chief root. That this substitution of lateral hypocotyledonary (adventitious) roots actually takes place can be shown by the intentional destruction of the chief root, which, as above stated, sometimes takes place by withering. The same thing may be induced higher up in the hypocotyl by removing the lower end by a transverse cut. Lateral injuries of various forms, even when they extended as far as the central cylinder, did not stimulate the formation of new roots, nor does this occur, excepting at the extreme lower end after longitudinal splitting of the hypocotyl. The growth of these lateral roots is considerably slower when the end is removed, from which it appears that the tissues are the less able to form roots, the further the point of injury is from the original radicle. A month to six weeks may elapse before the fundaments of these new roots may be readily seen, and the general development of the seedling is correspondingly slow. The plumule is, however, often well developed before the seedling becomes separated from the tree (Fig. 1).

A very interesting case of vivipary is recently reported by Dr. O. Stapf * to occur in one of the tropical grasses (*Melocanna bambusoides* Trin.) of the forests of Bengal. In this plant the endosperm (presumably in the mature fruit) is lacking, while the testa and pericarp are specialized to form nutrient tissues. The scutellum is very considerably enlarged and occupies the space otherwise filled by the endosperm. The scutellum, which is richly supplied with vascular tissues, acts, during germination, upon the pericarp in a manner analogous to its action in other grasses on the endosperm. Dr. Stapf believes that certain other genera (*Melocalamus* and *Ochlandra*) offer similar conditions.

Dr. J. K. Small has reported vivipary to occur in *Tillandsia*

* Nature, 65 : 548. 10 Ap. 1902.

Balbiviana Small and in one of the southwestern oaks, *Quercus fusiformis* Small. It is interesting to note in this connection that in certain of our common oaks (*Quercus rubra* L., *Q. palustris* DuRoi, *Q. coccinea* Wang., and *Q. velutina* Lam.) while vivipary, in the exact sense, has not been observed, nevertheless in these germination commences immediately upon the fruit reaching the ground in the autumn.

Vivipary, it seems, is by no means the unusual condition it has generally been supposed to be.

TEACHERS COLLEGE, COLUMBIA UNIVERSITY.

A KEY TO THE NORTH AMERICAN SPECIES OF RUSSULA—II *

BY F. S. EARLE

SECTION 3, RIGIDAE

1.	Pileus dry, smooth, glabrous.†	2.
	Pileus pruinose, furfuraceous, areolate, etc.	5.
2.	Pileus white or tinted.	3.
	Pileus deep red or bright red.	4.
3.	Taste mild; pileus often rose-tinted.	*R. albella* Pk.
	Taste acrid; pileus pure ivory-white.	*R. albidula* Pk.
4.	Stipe white or reddish-white; pileus cinnabar-red, acrid.	*R. rubra* Fr.
	Stipe blood-red; pileus blood-red or purplish-red.	*R. Linnaei* Fr.
5.	Pileus pure white, then alutaceous, rivulose.	*R. lactea* (Pers.) Fr.
	Pileus yellow, paler with age, slightly mealy.	*R. flavida* Frost
	Pileus grayish-brown, pulverulent or scurfy.	*R. pulverulenta* Pk.
	Pileus cinnamon, rimose, then floccose.	*R. cinnamomea* Bann.
	Pileus greenish, areolate.	*R. virescens* (Schaeff.) Fr.
	Pileus rose-red.	6.
	Pileus changeable, often dingy purple when young.	7.
6.	Pileus with disk lighter, whitish, rimose-scaly.	*R. lepida* Fr.
	Pileus with disk darker, pulverulent, shining.	*R. Mariae* Pk.
7.	Lamellae white; pileus areolate.	*R. cutifracta* Cke.
	Lamellae yellow; spores yellow; pileus silky-squamulose.	*R. olivacea* Fr.

* Continued from page 103.

† Some of the species assigned to section Rigidae are glabrous and perhaps should be excluded.

Section 4, Heterophyllae

1.	Pileus flesh-color or pink.	2.
	Pileus yellow or ochraceous.	5.
	Pileus brown or gray-brown.	6.
	Color of pileus changing, variable.	7.
2.	Stipe concolorous, pale flesh-color.	*R. polyphylla* Pk.*
	Stipe white.	3.
3.	Margin of pileus tuberculate-striate, ochraceous.	*R. elegans* Bres.
	Margin of pileus even, not striate.	4.
4.	Lamellae crowded, shining white.	*R. vesca* Fr.
	Lamellae distant, white to pale pink.	*R. Morgani* Sacc.
5.	Stipe whitish, equal; lamellae white, acrid, inodorous.	*R. granulata* Pk.
	Stipe concolorous, equal; lamellae yellow, acrid, inodorous.	*R. simillima* Pk.
	Stipe white above, reddish below, ventricose; lamellae white, discolored in drying.	*R. ventricosipes* Pk.*
6.	Margin of pileus tuberculate-striate; fetid.	*R. foetens* (Pers.) Fr.
	Margin of pileus even; inodorous.	*R. consobrina* Fr.
7.	Pileus at first usually with some shade of red.	8.
	Pileus never reddish, often dingy green; mild.	*R. heterophylla* Fr.
8.	Flesh white, acrid; lamellae narrow.	*R. variata* Bann.
	Flesh red under the cuticle; mild; lamellae broad.	*R. cyanoxantha* (Schaeff.) Fr.

Section 5, Fragiles

1.	Lamellae and spores white, not turning yellow.	2.
	Lamellae white, then yellow; spores lemon-yellow.	8.
	Lamellae and spores ochraceous.	16.
2.	Pileus white or whitish.	3.
	Pileus some shade of yellow.	4.
	Pileus dark brown, then pale tan.	*R. pectinata* Fr.
	Pileus some shade of red.	5.
3.	Pellicle not viscid or separable; stipe solid.	*R. anomala* Pk.
	Pellicle viscid; stipe hollow or stuffed.	*R. albida* Pk.
4.	Stipe short, 2–3 cm.; lamellae rounded behind.	*R. ochroleuca* (Pers.) Fr.
	Stipe longer, 5–8 cm.; lamellae subdecurrent.	*R. citrina* Gillet
5.	Taste mild.	6.
	Taste acrid or peppery.	7.
6.	Small, 2–4 cm.; margin striate; lamellae interveined.	*R. uncialis* Pk.
	Larger, 4–6 cm.; margin even; lamellae not interveined.	*R. purpurina* Quel.
7.	Pileus tuberculate, rugose; stipe spongy, tardily acrid.	*R. rugulosa* Pk.
	Pileus polished, shining; stipe solid, firm, elastic.	*R. emetica* Fr.
	Pileus polished, shining; stipe hollow or stuffed, fragile.	*R. fragilis* (Pers.) Fr.
8.	Pileus white or pallid.	*R. adulterina* (Fr.) Pk.
	Pileus some shade of yellow.	9.

* Said by Professor Peck to belong probably in section Rigidae.

Pileus some shade of red, at least when young. 10.
Pileus changeable, usually from purplish to olivaceous. 14.

9. Pileus orange, then paler; flesh white, changing to cinereous. *R. decolorans* Fr.
Pileus yellow or orange, disc darker; flesh white, unchanging, yellow under the cuticle. *R. aurata* Fr.

10. Stipe white with no reddish tints. 11.
Stipe more or less reddish. 13.

11. Small, pileus 2.5 cm. *R. pusilla* Pk.
Larger, pileus 5–12 cm. 12.

12. Margin of pileus even; taste peppery. *R. paxilloides* Earle.
Margin furrowed, tubercular; taste mild or subastringent. *R. integra* Fr.

13. Pileus smooth; lamellae subdistant, interveined. *R. integra rubrotincta* Pk.
Pileus smooth; lamellae somewhat crowded, interveined. *R. palustris* Pk.
Pileus punctate; lamellae not interveined. *R. punctata* Gillet

14. Lamellae subdistant, interveined. *R. abietina* Pk.
Lamellae crowded. 15.

15. Stipe soon hollow; pileus fading to yellowish. *R. puellaris* Fr.
Stipe soon hollow; pileus deep purple, disc black. *R. puellaris intensior* Cke.
Stipe stuffed, soft; pileus 2.5–5 cm. *R. nitida* (Pers.) Fr.
Stipe solid, spongy; pileus 7–12 cm. *R. decolorans* Fr.

16. Pileus some shade of yellow. 17.
Pileus some shade of red, at least when young. 21.
Pileus some shade of purple, often variable. 22.

17. Stipe white or whitish. 18.
Stipe ochraceous. *R. ochracea* Fr.

18. Margin of pileus even. *R. lutea* (Huds.) Fr.
Margin striate with age. 19.

19. Small; pileus 2.5–5 cm. 20.
Larger; pileus 5–10 cm., pale yellow, mild or subacrid. *R. flaviceps* Pk.

20. Pileus light yellow, then pallid; lamellae saffron. *R. vitellina* Fr.
Pileus flesh-color, then yellow; lamellae ochraceous. *R. chamaeleontina* Fr.

21. Pileus 4–7 cm.; stipe rosy pruinate. *R. roseipes* (Secr.) Bres.
Pileus 15 cm.; stipe glabrous. *R. alutacea* Fr.

22. Pileus dark purple or blackish-purple. 23.
Pileus lighter, fading to pallid. *R. nauseosa* Fr.

23. Stipe red, lamellae yellow from the first. *R. ochrophylla* Pk.
Stipe white, lamellae at first white, changing color when injured. *R. atropurpurea* Pk.

NEW YORK BOTANICAL GARDEN.

A NOTE ON THE VITALITY OF THE SPORES OF MARSILEA *

BY MARSHALL A. HOWE

In 1888, Professor D. H. Campbell † alluded to the germination of spores of *Marsilea Aegyptiaca*, "in some cases twelve years old." The material with which he worked had been preserved in a dry condition in the Botanical Museum of Berlin, and the spores germinated within thirteen hours after being placed in water. In the course of some remarks on this subject before the Cleveland meeting of the Botanical Club of the American Association for the Advancement of Science, Professor Campbell is reported ‡ to have said that of spores eleven years old, fifty per cent. germinated, and of those five years old, almost all grew. In the *Botanical Gazette* for 1895 (**20** : 229), Professor Barnes recorded a still more surprising instance of retention of vitality in the case of the spores of *Marsilea quadrifolia*, which germinated after the sporocarps had been kept continuously for three years in commercial alcohol (95%), the natural inference being that the exceedingly hard wall of the sporocarp is so compact as to resist successfully the penetrating powers of strong alcohol for a period of three years at least.

In May, 1900, for use in a course of laboratory instruction in Columbia University, three or four sporocarps were taken by the writer from an herbarium specimen of *Marsilea quadrifolia* collected by L. M. Underwood and C. R. Barnes, on June 13, 1891, in Fresh Pond, near Cambridge, Mass. (whence, also, the specimens preserved in alcohol by Professor Barnes came). These sporocarps were placed in water after a small portion of the wall of each had been cut away in order to give the water a better chance to penetrate, and they soon burst open, emitting the long gelatinous ring and the attached sori in the way figured

* Read before Section G of the American Association for the Advancement of Science, Pittsburg, July 3, 1902.

† Bull. Torrey Club, **15**: 259. O. 1888; Berichte Deutsch. Bot. Gesellsch. **6**: 340. 1888.

‡ Bot. Gaz. **13**: 235. S. 1888.

in most of the larger botanical text-books. Later, the prothalli were formed, but the spermatozoids were not seen in a motile condition at this time owing to the lack of continuous observation. They were seen, however, in great numbers after the motile period, filling the walls and passage-way of the gelatinous funnel which forms about the female prothallus. In May, 1901, the experiment was repeated with similar results. In May, 1902, a sporocarp from the same material, having then been in the herbarium practically eleven years, was placed in water, and the stages of the resulting germination of the spores were watched more carefully. Swarms of motile spermatozoids were noticed after about fourteen hours, and for eight hours longer a greater or less number could be found in motion. Nearly every spore in the sporocarp germinated. Some of the megaspores were finally removed from the water and kept upon wet filter-paper for ten days, when embryo-sporophytes, with the first leaf a centimeter long, had developed. The remarkable vitality of these eleven-year-old spores naturally suggested that the age-limit for germination had not been reached, and attempts were made to germinate spores from about twenty other specimens of various species which had lain in the herbarium for periods varying from twelve to thirty years. In one of these cases the attempt was successful. This was with material of *Marsilea vestita* preserved in Professor Underwood's herbarium, and collected by Mr. W. N. Suksdorf, in Falcon Valley, Washington, the pocket bearing the double date "Nov., 1883" and "Aug., 1884." The spores were germinated on June 7, 1902, so that even supposing August, 1884, the later of the two dates, to be the correct one for the material used, vitality had been retained for practically eighteen years. Six sporocarps were tried, all of which opened in the normal fashion. Nearly all of the megaspores formed prothalli with archegonia. After fertilization, embryos of considerable size were grown by sowing the spores on damp filter-paper. Of the microspores, practically all showed advanced stages of germination, such as the formation of the prothallus and protrusion of the antheridum,, but only about a half of them set free motile spermatozoids. The first free spermatozoids were seen in 11¼ hours after the sporocarps were placed in water.

The writer finds no published record in regard to long-continued vitality of the spores of *Marsilea* which equals the case described above, though it is more than probable that a period of eighteen years does not exhaust the possibilities in the matter. Failure in the experiments with spores of greater age is inconclusive as is shown by numerous failures with material of a much less age. It is evident that much depends upon the collection of the sporocarps at just the right stage of maturity.

SHORTER NOTES

A NEW HEMIZONIA FROM CALIFORNIA. — **Hemizonia grandiflora.** Annual: stems erect, branching, 1–3.5 dm. high, glandular-villous and somewhat heavy-scented: leaves all sessile, the lowest opposite, linear-lanceolate, acute, 8–15 cm. long, serrulate and scabrous on the margins, sparsely lanate with very long appressed hairs, those subtending the main branches similar but alternate, those of the floral branches reduced, 1–3 cm. long, obtuse, or the longer ones acutish, glandular-pubescent: heads very showy, 2.5–3 cm. broad: involucral bracts broadly lanceolate, subacute, 6–7 mm. long: rays 8–10, 10–12 mm. long, 7–9 mm. wide, 3-lobed to near the middle, the lobes obtuse, the middle one about half as broad as the outer ones and somewhat shorter, pure white or the midveins of the lobes pinkish beneath; disk corollas glabrous without, their lobes ciliate within toward the apices: outer bracts of the receptacle united into a cup: achenes black, very shortly stipitate, obovate, smooth, rounded on the back and faintly keeled, 2.75 mm. long, 1.5–1.75 mm. broad.

This species is closely related to *H. luzulaefolia* DC., but differs from that species in having much larger heads, involucral bracts and achenes, and greener foliage. The conspicuous lanate leaves are confined to the base in *H. luzulaefolia*, while in this species they extend up on the stem and subtend the main branches. Finally, *H. luzulaefolia* is a late summer and autumnal species, while this is in full bloom in the middle of May and will have fruited and gone before that species begins to flower.

Crystal Springs Lake, San Mateo Co., California. Growing on hillsides which are composed of serpentine rocks. Collected by the writer (no. 2446) 11 May, 1902. LEROY ABRAMS.

AN UNDESCRIBED SPECIES OF HYDROPHYLLUM.—Early in May of 1899 Dr. MacDougal collected a number of plants in northern Minnesota and sent them to the New York Botanical Garden. A *Hydrophyllum* of this collection bloomed in June of this year for the first time, alongside of plants of *Hydrophyllum Virginicum*, obtained in 1896 from Mr. Harrison, of Lebanon Springs, N. Y.

The Minnesota plant much resembles *H. Virginicum* in habit and foliage; but differs from it strikingly in floral characters. At the time of flowering the calyx-segments are erect against the corolla, while in *Virginicum* they are widely spreading, and in the new species they remain nearly erect in fruit; in both species they are narrowly linear and about equally ciliate. In *H. Virginicum*, the corolla-segments are erect, while in the Minnesota plant their tips are spreading; the color of the corolla is a marked purple in the new species, while in the plants of *Virginicum* studied, the corolla is pale, nearly white, although I think, from observations made on *Virginicum* in the Alleghanies, that the color in that species varies considerably. In *H. Virginicum* the petioles are slightly ciliate, while in the Minnesota plant the upper ones are strikingly so.

The foliage of the two species is however so similar that I have not yet been able to sort them satisfactorily in the herbarium, except by the ciliate petioles, which I am not sure is a constant character. I call the new species **Hydrophyllum patens.**

N. L. BRITTON.

NOTES ON VERBENA.—I. **Verbena racemosa.** Annual (?), hirsute. Stem branched at the base, the several branches erect and ascending, 10–20 cm. tall: leaves firm; blades oval or ovate in outline, about 2 cm. long, 1.5 cm. wide, deeply twice 3-parted into linear segments, the lower ones petioled, the upper nearly sessile: spikes terminating the branches, short-peduncled, cylindric, 2–4 cm. long at maturity, rather dense: bracts 4–7 mm. long, lanceolate: calyx rough-hairy, surpassing the bracts; lobes linear-subulate, shorter than the tube: corolla light blue or nearly white, 1 cm. long, persistent; limb about 4 mm. broad: fruit 3 mm. long.

In low places on sandy soil, from the vicinity of El Paso to Martin County, Texas. April to June. *Verbena racemosa* is

related to *V. bipinnatifida* with which it has heretofore been associated. It differs from the latter species in the narrow leaf-segments and the smaller, pale and persistent corollas. It hybridizes with *Verbena Wrightii.*

II. **Verbena brevibracteata** (A. Gray). [*V. bracteosa* var. *brevibracteata* A. Gray, Syn. Fl. N. Am. 2 : 336. 1878.] This plant is so different from *Verbena bracteosa* that I am surprised it was associated with that species as a variety. It has an erect habit and grows in sandy woods or in fields. The flowers are in dense spikes and the corolla is red and twice as large as that of *V. bracteosa.*

HENRY EGGERT.

EAST ST. LOUIS, ILLINOIS.

LUNULARIA CRUCIATA "IN FRUIT."—*Lunularia cruciata,* heretofore recorded as "gemmiferous but always sterile in America," has at last fruited here. In a large lath-house belonging to the California Nursery Company, in Niles, California, this hepatic is very abundant, overrunning the half-sunk pots and the ground between them.

Early in April on the drier parts of this shady earthen floor, the *Lunularia* was found to bear many of the small, white tuft-like sheaths that cover the young archegonial receptacles. Two weeks later quantities of the androecia were observed on the same plants but not in any case on the very same division of the thallus. By the 9th of May there were eleven perfect capsule-bearing receptacles and many that were just beginning to push through the scales of the sheaths, the silvery, pellucid peduncles shining through the fimbriate edges. Later, many of these perfected, but more just withered as the air became drier and warmer.

This lath-house is for the protection of potted azaleas, rhododendrons, araucarias, acacias, etc., is kept damp, and is of course more open to wind and rain than a glass house. Possibly these conditions approach those of the European habitats of this liverwort.

JULIA T. SHINN.

NILES, CALIFORNIA.

PROCEEDINGS OF THE CLUB

Wednesday, May 28, 1902

This meeting was held at the New York Botanical Garden at 3:30 p.m.; Dr. MacDougal in the chair; 15 persons present.

The reading of the minutes was dispensed with on account of the absence of the secretary.

The first paper on the program was by Mrs. N. L. Britton, under the title "Remarks on West Indian Mosses." Comments were made on several questions of synonymy and nomenclature arising from a study of collections recently made in Porto Rico by Mr. A. A. Heller and by Professor Underwood, and in St. Kitts by Dr. Britton. Attention was directed particularly to the genus *Sematophyllum* Mitt. 1864 (= *Raphidostegium* De Not. 1867 = *Rhynchostegium*, section *Raphidostegium* Br. & Sch. 1852). This genus is chiefly tropical or subtropical in its distribution, though eleven species are known to occur in North America north of Mexico.

The second paper was by Dr. P. A. Rydberg, on "Some Genera of the Saxifragaceae." The speaker presented some of the results of studies intended as a contribution to a projected work on the flora of North America. The family name Saxifragaceae was used in a restricted sense, excluding *Ribes*, *Hydrangea*, *Philadelphus*, *Parnassia*, *Itea*, etc. The members of the family in the narrower sense are all herbaceous plants with the exception of a single species of *Heuchera* which has a sort of aërial woody stem. Dr. Rydberg commented especially upon the genera *Bolandra*, *Therofon*, *Telesonix*, *Hemieva*, *Tiarella*, *Heuchera*, *Tellima*, *Lithophragma*, *Mitella*, and *Chrysosplenium*, referring to the geographical distribution and number of species of each. *Heuchera* is the largest of these genera, being represented by 58 species in North America, including Mexico. The paper was discussed by Dr. Britton and others.

Professor F. S. Earle made a brief report on a recent trip to western Texas and eastern New Mexico, stating that 800 numbers of botanical specimens were collected. April and May

seemed too early in the season for finding many herbaceous plants in flower and this was especially the case with the monocotyledons.

Dr. N. L. Britton showed specimens of *Washingtonia longistylis* collected a few days previously near Washington, D. C., differing from Torrey's type of the species in greater hairiness.

Mrs. Britton alluded to the organization of "The Wild Flower Preservation Society of America." Professor Earle remarked upon the region west of the Pecos River, where vegetation has been nearly exterminated by overstocking with cattle, as a proper field for the activities of the Society.

Dr. MacDougal showed a corm of *Amorphophallus*, kept for twenty months in a dark room, where it had flowered. New buds, apparently adventitious, had formed near its base.

MARSHALL A. HOWE,
Secretary pro tem.

NEWS ITEMS

Dr. W. Seward Webb has contributed $6,000 toward the fund for the purchase and maintenance of the Pringle herbarium by the University of Vermont.

Hon. Addison Brown, president of the Torrey Botanical Club, received the degree of LL.D. from Harvard University at the last commencement.

Professor F. S. Earle, assistant curator of the New York Botanical Garden, was recently granted the honorary degree of A.M. by the Alabama Polytechnic Institute.

Professor Alexander W. Evans, of Yale University, and Mr. Percy Wilson, of the New York Botanical Garden, are making botanical collections in Porto Rico under the auspices of the latter institution.

Dr. William A. Murrill, of the Boys' High School, New York City, is spending the summer in Europe, where he will devote especial attention to the study of type specimens of fungi, particularly those of Fries in Sweden, and those of Berkeley and Cooke in England.

Representatives of the Torrey Club enjoyed the generous hospitality of the Syracuse Botanical Club on the Fourth of July. A party of forty spent the day in the vicinity of the "green lakes," near Jamesville, N. Y. The following day was chiefly devoted to collecting in the saline formation about Onondaga Lake.

"The Home Aquarium and how to care for it" is the title of an illustrated octavo work of 213 pages written by Mr. Eugene Smith and recently published by E. P. Dutton & Co., of New York. The book will prove of service in the determination as well as in the cultivation of some of the common aquatic plants and animals.

We learn from *Science* that Dr. E. C. Jeffrey, instructor in the University of Toronto, has been appointed assistant professor of vegetable histology and general morphology in Harvard University; also that Professor F. A. Waugh, of the University of Vermont, has been called to the chair of horticulture in the Massachusetts Agricultural College at Amherst, Mass.

The recent meeting of the American Association for the Advancement of Science at Pittsburg was of unusual interest to botanists. The association now includes about 3,500 members, and 320 papers were read at the sessions, of which 79 were purely botanical, while many other titles were presented before various sections and in the meeting of various affiliated societies, the subject matter of which lay chiefly in botany. The vice-presidential address by Dr. B. T. Galloway on "Applied Botany, Retrospective and Prospective" was a masterly presentation of the practical applications made of botanical knowledge and presented a clear outline of the phases of the subjects from which direct useful results may be expected. Mr. F. V. Coville was elected chairman of Section G for the coming meeting at Washington during the convocation week, and Dr. C. J. Chamberlain secretary. Twenty-three papers were read at the session of the Botanical Club, and the committee on nomenclature held numer-

ous and protracted sessions in which definite progress was made in dealing with some of the open questions in nomenclature.

The Wild Flower Preservation Society of America held a business meeting of its board of managers, and a popular meeting, in which the greatest interest was evinced in the purpose and rapid progress of this new organization.

Dr. Halsted's address as past president of the Botanical Society of America was not given owing to his continued illness, but about thirty papers were read before this body, many of which embodied the results of completed researches and represented the principal phases of the entire subject. Dr. B. T. Galloway was elected president and Dr. D. T. MacDougal, secretary, for the ensuing year. This organization passed a series of resolutions on Monday, June 30, 1902, by which the sum of $500 is set aside from its yearly income, this year and every succeeding year, to be used in making grants in aid of investigations. This measure goes into operation at once, and applications from the members and associates of the Society may be sent to the secretary at any time. The funds of the Botanical Society of America consist of the accumulated dues paid in by the members, and the grants in question probably constitute the only series ever offered in America, the money for which has been contributed wholly by a body of scientific workers. [D. T. MacD.]

Vol. 2 No. 9

TORREYA

September, 1902

THE VEGETATION OF NORTHWESTERN OREGON

By J. E. Kirkwood

A glance at the map of Oregon will show that the northwestern part of the state is mostly mountainous. In fact, that area which lies south and west of the lower course of the Columbia River, comprising mainly Columbia, Clatsop and Tillamook counties, is a mountainous region traversed by the narrow valleys of such small streams as the Nehalem and Nestucca rivers. From the Columbia River extending southward the Coast Mountains leave little space between their bases and the ocean, most of the tillable land of this section being found on the lower foothills and in the broadened outlets of the canyons of streams which head among the mountains and empty directly into the sea. East of the Coast Mountains lies the Willamette valley which contains most of the farming land of the state west of the Cascades. The flora of this region presents some interesting features.

As it has been about fifty years since the first considerable immigration into western Oregon, most of the original forest-covering has been removed from the lowlands. In those parts of the valley where this has occurred, a remnant of the forest remains along the banks of streams whose location and course may by this means be determined from a distance. Some of the trees which occupy such situations are easily recognized for miles by an experienced eye. Especially is this true of *Abies grandis* with its cylindrical outline and bluntly conical top. At shorter range one may easily recognize *Thuya gigantea* and *Pseudotsuga mucro-*

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nata. But such places are the special habitat of *Abies* and *Thuya* of the species above mentioned and *Taxus brevifolia* representing the gymnosperms, which are associated with a lower growth of deciduous trees and shrubs, among which are very readily found *Fraxinus Oregana, Acer circinatum, A. macrophyllum, Cornus Nuttalli, Prunus emarginata, Alnus Oregana, Philadelphus Californicus, Spiraea Douglasii, Holodiscus discolor* and *Viburnum ellipticum.*

These form in most places dense thickets of undergrowth overhanging the muddy banks of the streams. So far as was observed, the vegetation above described was very uniform. As we ascend the streams from the alluvial lowlands toward the hills, however, a considerable difference may be observed.

The uplands, as the term is here used, have an altitude of from 200 to 500 feet above sea-level and include practically all the soil not restricted to creek or river bottoms within this altitude. They may not be much higher than the bottom lands but the soil contains more sand, is coarser and drains dry more readily. This brown loam, at the most but a few feet in depth, is underlaid by a clayey subsoil. The uplands are undulating with here and there comparatively small areas, swales, with a peculiar clayey soil supplied with springs and possessing some peculiarities of vegetation.

The forest covering of the uplands consists mainly of *Pseudotsuga.* As a rule no other gymnosperms are present. In many places this tree has such a monopoly of soil and light as to exclude almost everything else. In the more open woods, however, we find *Cornus, Acer, Corylus, Spiraea,* and sometimes *Quercus Garryana.* *Quercus* usually forms groves by itself and does not grow so well in the open forest of *Pseudotsuga* as do some other deciduous trees. There is not a large number of deciduous trees and shrubs and most of the lower growth of the upland forests consists of but few species of the genera above named. A smaller shrubby growth consisting of species of *Gaultheria* and *Berberis* constitutes nearly all of the immediate soil-covering over large tracts of forest land.

The swale areas, as has already been said, possess some peculiarities worth noticing. While the Douglas spruce is still the

most prominent feature of the vegetation, yet it is not so abundant as elsewhere and leaves space for a luxuriant undergrowth of *Fraxinus*, *Crataegus*, *Spiraea*, *Amelanchier*, *Acer*, *Salix*, etc. It will be noticed that we meet here the same genera which are characteristic of the bottom lands, and, it may be added, the same species as well. Although the soil is wet, as is indicated by the roots of trees which spread over the surface of the ground instead of growing downward, yet we do not find those gymnosperms which are most characteristic of bottom lands. Here, too, we find little of *Gaultheria* and *Berberis* so characteristic of the rolling lands and in the more open spaces find species of *Rosa* and *Symphoricarpos* and dense thickets of *Spiraea Douglasii.*

Some of the densest forest-covering of the upland is second-growth Douglas spruce some forty or fifty years old. As a rule, in such woods there are large trees of a much greater age whose low, wide-reaching branches indicate an isolated condition during most of their earlier years. It is said by the older inhabitants that before much immigration had taken place, considerable areas of land in the lower Willamette valley were covered only by large isolated trees and a luxuriant growth of grass, a condition, as they say, maintained by the Indians. As parts were fenced off by the settlers for cultivation, the rest was neglected and soon sprang up to undergrowth which one sees to-day as a forest of young trees fifty feet or more in height. Whether the report is true or not, the forest conditions in many places now show plainly that a younger forest has arisen there in the last fifty years. A tract of land which was under the writer's own observation in 1884, was then almost entirely devoid of undergrowth, the growth having been cleared off and burned a few years previous. In the summer of 1901, however, this tract was again visited and found covered with an almost inpenetrable growth mostly of young *Pseudotsuga*, about twenty feet in height. The Douglas spruce is, however, not the first to appear on neglected areas. As a rule, a growth of *Salix* soon appears, and for some time it is the only thing in sight. Later, this growth is largely replaced by other deciduous shrubs, *Corylus rostrata*, *Holodiscus discolor*, etc., which in turn yield to the spruce. The forest encroaches

very readily on neglected pasture lands and other areas which have previously borne forests. This we may see demonstrated in tracts devastated by forest fires, though such cases are found mostly in mountainous regions. The conditions above described are found mainly in the northern part of the Willamette valley.

The valleys of streams tributary to the Willamette which head in the Coast Mountains are flanked in their upper parts by forests of much the same character as those described above. Along these streams it is noticeable that the vegetation is much the same as that which characterizes the river bottoms already described but along with *Thuya* and *Abies* we find *Tsuga heterophylla*. In the undergrowth the occurrence of *Rubus spectabilis* is occasionally marked. Among the more prominent herbaceous plants *Micrampelis Oregana* is often very conspicuous, covering shrubs and small trees to a height of twenty feet or more.

The vegetation of the Coast Mountains is a heavy forest growth, mostly of *Pseudotsuga* with a considerable sprinkling of *Tsuga* and *Thuya* ; of the deciduous trees there are species of *Acer*, especially *A. circinatum*, and *Alnus*. In the older burned areas, *Alnus* springs up plentifully along the water courses and every small ravine with springy soil is marked by a line of alders. Comparatively little of the second growth in these "burns" is evergreen; willows and alders are by far the most conspicuous. Most of such burned areas have very little forest growth at all to show in place of the once magnificent growth which covered the mountain tops and the bleached remains of which are still standing or lying upon the ground. In such places the most conspicuous growth is the ubiquitous *Pteridium aquilinum* which often excludes everything else except shrubby plants such as *Rubus Nutkanus* and species of *Vaccinium*.

That section of the state which lies between the summit of the Coast Range and the Pacific Ocean is much more abundantly supplied with moisture than the Williamette valley and parts farther east. The mean annual rainfall in this belt is not far from 80 inches. On the eastern slope of the range it is much less, about 60 inches, diminishing to about 50 inches in the middle of the valley. In some places on the coast the mean precipitation

is even greater. Although, as is the case in the interior, the months of July and August are the driest of the year and about two per cent. of the rainfall of the year occurs in these months, still the western slope of the range is covered by heavy fogs for much of the time during this period. Consequently, vegetation here lacks very little water at any time during the year.

Along the water-courses everywhere in this region the shrubby vegetation appears pretty much the same. *Rubus spectabilis*, the salmon-berry, as it is commonly called in the region where it grows, forms dense thickets with *Acer circinatum* and *Sambucus racemosa*. In the lower lands the alders are larger but usually do not form the dense thickets which are frequently found at higher altitudes. In the more open bottoms *Echinopanax horridum* frequently appears though it seems to prefer the bottoms of deep canyons and more abundant shade. The leaves of this Devil's-cane, as it is commonly called, are from a foot to eighteen inches across and spreading out horizontally make a very showy appearance and form a very characteristic part of the vegetation along deeply shaded streams.

On the lower hills near the coast the forest consists mainly, in some places at least, of *Picea Sitchensis*. It is not found in this latitude many miles from the beach and so far as the writer has observed does not attain the splendid proportions which are reached by the Douglas spruce in its favorite habitat. This tree reaches its best development back a mile or two from the beach but is not conspicuous at high altitudes. It holds the outposts of arboreal vegetation on the sand dunes, which it shares with *Pinus contorta*, but in such places like other trees it is dwarfed and stunted.

In the Coast Mountains the range of arboreal species is not great. The predominant element of the vegetation is the so-called fir, or Douglas spruce, along with lesser quantities of other trees already mentioned; the latter, however, rarely if ever occur in sufficient quantity to lend any special character to the landscape.

While there is a uniformity in distribution throughout the mountainous regions, of those plants mentioned above as occur-

ring in the Coast Range, one is often impressed by the abrupt transition from the vegetation of the flat and open uplands of the lower Willamette valley to that of the mountains. A comparison of the Nehalem and Willamette river valleys is a case in point. The Nehalem flows through a mountainous region and in part of its upper course is separated from the Willamette valley by a low range of mountains some ten miles across. While there is a difference of not more than 500 feet in the altitude of the two valleys at some places, there is a marked difference in soil and vegetation. The Nehalem valley has practically the same vegetation as the mountain region which it drains. As one crosses the divide into the Nehalem region the difference in the vegetation is readily apparent. The oak is left behind but the hemlock becomes conspicuous. Instead of the vegetation peculiar to the stream bottoms of the lower country, the water courses are fringed with the wild currant, salmon-berry and Devil's-cane, for the most part. In a detailed description of the flora, various other differences might be mentioned. The whole region offers an interesting field for the study of the distribution of native species.

SYRACUSE UNIVERSITY.

EXTRUSION OF THE GAMETES IN FUCUS

BY GEORGE J. PEIRCE

Dr. E. B. Copeland's note in TORREYA for November, 1901, on the extrusion of the gametes of *Fucus* suggests a comment or two.

In the first place, Thuret * in 1854 and Oltmanns † in 1889 said that the escape of the egg-cells and spermatozoids is "hastened" by exposing fertile branches to the air. There may be other appearances of the same statement, but these two are worth instancing. I doubt either of these authors being willing

* Thuret, G. Recherches sur la fécondation des Fucacées. Ann. d. Sci. Nat., IV. 2 : 197–214. 1854.

† Oltmanns, F. Beiträge zur Kenntniss der Fucaceen. Bibl. Botanica, 3[14] : 1–94. 1889.

to say or to imply more than that the escape of the reproductive elements is *hastened* by the drying and contraction of the fertile fronds when they are exposed to the air. Unless I do Dr. Copeland an injustice, he does imply that their escape is effected by the shrinkage of the parts. On this point I wish to state my own experience.

Last summer and the summer before, at the Hopkins Seaside Laboratory, Pacific Grove, California, I repeatedly put the fruiting tips of *Fucus evanescens* Ag., into glass dishes of sea-water and left them, often for two weeks, without changing the water or baring the plants. The gametes escaped nevertheless, spores and young plants of various ages presently appearing on the bottom of the dishes. In this way I was able to get a series of young plants consisting of from one to many cells.

In these cases, neither water-pressure nor the compression of the parts within by the drying and contraction of the outer parts, can have had anything to do with the escape of the spores. Another factor was concerned, namely, the solution of the gelatinized walls and other gelatinous material surrounding the gametes. When this goes into solution, the antherozoids can swim out of the conceptacles. This does not, however, account for the escape of the non-motile egg-cells. It will be noticed that the fruiting tips of this species of *Fucus* are covered with gelatinous drops, a drop at the mouth of each conceptacle, whether the plants are submerged or exposed. The drops ooze out, that is are squeezed out, from the cavity of the conceptacles. The expressed slime may become so abundant as to form a coating over the surface of the fruiting tip. The pressure which forces this out is developed by the parts surrounding the conceptacle and first becomes effective when the antherozoids and egg-cells, or the antheridia and oögonia, become detached and are imbedded in a gradually dissolving gelatinous matrix. As this gelatinous material dissolves, it resists the compressing effect of the walls of the conceptacle less and less, and presently becomes squeezed out through the mouth of the conceptacle.

So far as this species of *Fucus* is concerned, therefore, the extrusion of the gametes (or, more properly, of the sexual

organs) from the conceptacles, is accomplished by mechanical pressure which is developed within the plant, whether the plant dries and contracts or not. I fancy the same thing is true of the other species of *Fucus* on this coast, and also of the species on the Atlantic Coast, including the unnamed one about which Dr. Copeland writes. It is obvious, however, that the drying, contraction, and compression, of which Dr. Copeland speaks, will supplement the pressure which normally develops within the plant itself.

Where *Fucus* grows in thick masses covering the rocks between tide-marks, only those plants living far up on the sides and on the tops of rocks will have any considerable part directly exposed to the air and sun. When the tide goes out, a very small part of a mass of *Fucus* is wholly exposed, as the fronds overlie and protect one another, only the topmost layer being wholly uncovered. Of course the overlapping is more or less incomplete, so that some of the tips of the plants below may be exposed. These exposed tips and whole plants represent, however, only a small proportion of all the fruiting parts. These exposed parts are the only ones which would dry and contract in such a way as to expel the reproductive organs and elements, and yet other plants and other tips are undoubtedly also fertile, in the fullest sense of the word.

Again, the amount of drying, contraction and consequent forcing out of the reproductive parts when low tide comes at night would be very slight. Are such tides unfavorable to reproduction? Then, too, there is little or no drying of *Fucus* or anything else in fog or rain. At these times, too, the gametes, if ripe, should be forced out of the conceptacles.

I think I have shown the desirability of the plants' possessing some adequate means of removing the gametes from the conceptacles no matter what the weather, the time of day and the state of the tide may be. Unfortunately I cannot prove that the Atlantic * species of *Fucus* are in this respect as independent of

* [There are at least three very distinct species of *Fucus* about New York City: a hermaphrodite species (*F. spiralis* L.?) found only near the high-water mark; a dioecious species (*F. vesiculosus* L.) of rather wide range in the littoral zone; and a hermaphrodite species (*F. evanescens* Ag.) growing near the low-tide line and in

atmospheric conditions as are our Pacific species. At all events the matter deserves further examination.

STANFORD UNIVERSITY, CALIFORNIA.

MUTUAL IRREGULARITIES IN OPPOSITE LEAVES

BY FRANCIS E. LLOYD

It is not uncommon to find that the leaves of the lilac (*Syringa vulgaris* L.), which are generally supposed to present little variation in shape, become notched on one side. A tooth or a lobe of considerable size may thus be formed, so that the simple cordate leaf is then lobed asymmetrically. The lobe is sometimes of quite regular form and ends in a fine tooth at the tip. It is moreover supplied with veins which give it a normal appearance. At other times it is more rounded; or there may be nothing more to suggest it than a rounded irregularity on the margin, accompanied by a slight warping of the leaf blade near by.

Now it has further been observed that when such an irregularity occurs, the leaf opposite—the leaves being in decussating pairs—has with few exceptions a similar lobing, but on the *other* side of the midrib; and therefore, since the ventral surfaces of the leaves are opposed in the bud, on the same side of the axis of the stem. A considerable number of similar instances have been observed by me in some other plants with opposite simple leaves, namely in *Lonicera* and *Forsythia*. What appears at first blush to be a variation of the same kind may occur also in compound leaves, and such a case I have found in the European ash, in which the terminal leaflets of a pair of opposite leaves showed mutual variations but in this case on the *same* side of the midrib. In one of the leaflets a lateral lobe only was formed, while on the other a complete lateral leaflet appeared in the corresponding position. The condition recalls that which arises in the juvenile opposite leaves of some plants (*Phaseolus*) and in the alternate leaves on the new shoots of others (*Rubus occidentalis*, *R. nigro-*

some cases rarely, if ever, uncovered. Farther north on the Atlantic coast, *Fucus edentatus* De la Pyl. and *F. serratus* L. are found near the low-water mark and do not as a rule become very dry at the ebbing of the tide.—ED.]

baccus, and *Rhus radicans*, the last with four or five partial or complete leaflets) or again on the older parts of the Japanese ivy (*Parthenocissus tricuspidata*).

Setting aside these cases of the ash and other compound-leaved plants, the explanation of the above-described phenomenon is to be found in the behavior of the leaf fundaments in the buds. In the case of the lilac the pair of youngest leaves is so disposed in the bud that the ventral surfaces of the two are faced and that their margins lie each against the other, and match exactly. As the leaves enlarge their blades become thinner and so curved that one leaf comes to be infolded by the other. It sometimes happens however that during the time that blades begin to overlap, the margins, as the result of unequal growth or pressure cross one another at one or more points, and further development is retarded at those places. That this crossing is the cause of the notching or lobing there can be no doubt, since I have found a pair of leaves in which the notches were so deep that the blades became too closely interlocked to be able, during their expansion from the bud, to separate.

That other irregularities of form, also, such as a sudden narrowing of the blade toward the apex, are due to similar causes, is apparent from the circumstance that these, too, are often asymmetrically mutual in opposite leaves, and that upon careful examination, other evidences of compression are to be seen.

Examination of the leaf fundaments in *Lonicera* and *Forsythia* shows that the above explanation is undoubtedly correct for them also. Whether a similar mechanical explanation is true also for the ash I have some doubt, and the cases of analogous appearances in alternate leaves cited are still more puzzling.

That the variations in the ash occur on the same side of the leaflets speaks against the application of the same explanation must be admitted, although it is to be noted that in the lilac the variations are sometimes mutual in the same way, namely on the same side of the midrib. This is to be explained by the fact that the crossing of the leaf margins does not always set up a disturbance of growth in both leaves involved at once.

This apparently unimportant phase of the study of leaf varia-

tions has, so far as I can learn, not been noticed before, and such variations may have but trifling significance.

It would be interesting in this connection to know whether these abnormal appearances, if we may call them such, are more frequent in leaves which appear in the spring — those therefore whose fundaments were laid down during the previous growing season — for we might suspect that the formation of the stiff, resistant bud scales of the winter buds, both during their first formation and their subsequent more or less irregular early spring development, would set up rather more pronounced, if not different, mechanical conditions than the scales or leaves of the more evenly developing summer buds.

I have to thank Miss Mary E. Hart for first drawing my attention to the variations in lilac leaves, and Miss Elsie M. Kupfer, who at my suggestion searched for and found a good number of fine examples of the same thing.

TEACHERS COLLEGE, COLUMBIA UNIVERSITY.

A KEY TO THE NORTH AMERICAN SPECIES OF LACTARIUS—I

BY F. S. EARLE

The species of this genus are at once distinguished from all other mushrooms by the flowing of a more or less abundant milky juice when cut or wounded. Many of the species are exceedingly acrid or peppery when raw but as is the case with the nearly allied Russulas this is said to disappear on cooking and most of the species are considered to be edible. So far as known, none of them contains a poison. As a rule they require longer cooking than most other mushrooms.

The most important paper on our American species is that by Peck in the 38th Report of the New York State Museum, in which he gives a synopsis and full descriptions of the species known to occur in the State. Of the following seventy-six species and varieties that have been reported as occurring in North America thirty-one have been described by Professor

Peck. Five others are supposed to be exclusively American while forty are common to this continent and Europe.

Key to the Sections of the Genus

1. Stipe central or nearly so. 2.
   Stipe excentric or lateral (none known from North America). Sec. Pleuropus.
2. Milk at first white, sometimes changing color on exposure. 3.
   Milk bright-colored (red, blue, etc.) from the first. Sec. Dapetes.
3. Lamellae not changing color with age, not pruinose; milk usually acrid (Sec. Piperates). 4.
   Lamellae pallid, then darker and pruinose; milk usually mild. Sec. Russularia.
4. Pileus viscid, at least when young. 5.
   Pileus dry, naked or clothed, not shining. Subsec. Piperati.
5. Margin of pileus naked from the first, pelliculose. Subsec. Limacini.
   Margin of pileus at first tomentose. Subsec. Tricholomoidei.

Subsection Tricholomoidei

1. Milk white, soon changing to yellow. 2.
   Milk white, unchanging. 6.
2. Stipe scrobiculate-spotted; pileus yellow, depressed. *L. scrobiculatus* (Scop.) Fr.
   Stipe not spotted. 3.
3. Pileus large, 10–15 cm., deeply depressed or infundibuliform, glabrate. 4.
   Pileus smaller, 4–10 cm., convex to subplane, villous. 5.
4. Stipe villous. *L. resimus* Fr.
   Stipe glabrous. *L. regalis* Pk.
5. Pileus dingy flesh-color to pale reddish bluff. *L. cilicioides* Fr.
   Pileus at first white, dirty yellow when old. *L. cilicioides albus* Pk.
6. Pileus white or whitish. 7.
   Pileus brownish or olivaceous. 9.
7. Pileus azonate, glabrous, margin soon naked. *L. subinsulsus* Pk.
   Pileus more or less zoned, clothed. 8.
8. Pileus white to pale ochraceous, tomentose. *L. torminosus* (Schaeff.) Fr.
   Pileus white, zoned and spotted with red, at first floccose. *L. controversus* (Pers.) Fr.
9. Pileus 6–20 cm., plane, flat; stipe tapering downward. *L. turpis* Fr.
   Pileus 4–8 cm., convex, center depressed; stipe tapering upward. *L. sordidus* Pk.

Subsection Limacini

1. Pileus sordid white; milk changing to lilac. 2.
   Pileus some shade of yellow; milk unchanging. 3.
   Pileus reddish flesh-color becoming paler; milk unchanging. *L. hysginus* Fr.
   Pileus some shade of gray; milk unchanging. 5.
2. Pileus azonate, thin, fragile, 5–8 cm. *L. uvidus* Fr.
   Pileus obscurely zonate or concentric-spotted, larger. *L. uvidus magnus* Pk.

3. Pileus azonate; spores white. *L. affinis* Pk.
Pileus zonate or subzonate. 4.

4. Stipe scrobiculate-spotted, hollow. *L. insulsus* Fr.
Stipe smooth, not spotted, solid. *L. zonarius* (Bull.) Fr.

5. Stipe spotted, hollow; pileus gray or grayish-lilac. *L. maculatus* Pk.
Stipe not spotted (or rarely so in *L. trivialis*). 6.

6. Lamellae staining when wounded. 7.
Lamellae not staining. 9.

7. Pileus gray with pink or lilac shades; lamellae staining greenish. 8.
Pileus gray with greenish shades; lamellae staining cinereous. *L. blennius* Fr.

8. Pileus 5–18 cm.; stipe 2.5–15 cm. long. *L. trivialis* Fr.
Pileus 2.5–5 cm.; stipe equal to or longer than diameter. *L. trivialis gracilis* Pk.

9. Lamellae and spores white; stipe 5–7 cm. long. *L. cinereus* Pk.
Lamellae and spores yellowish; stipe 4 cm. long. *L. acer* (Bolt.) Fr.

NEW YORK BOTANICAL GARDEN.

THE PITH CELLS OF PHYTOLACCA DECANDRA *

By HENRY KRAEMER

The structure of pith cells is so characteristic and so constant for certain species and genera, as was pointed out by Gris, that it will in all probability be found to have a taxonomic value in deciding the position of a number of more or less disputed genera and families. While the anomalous structure of the root, stem and leaves of certain species of *Phytolacca* has been more or less carefully studied, the pith cells of *Phytolacca decandra* are so marked in character as to warrant our attention in this connection.

The pith of this plant is unusually large, its diameter being about five sixths that of the entire stem. The active pith cells are more or less hexagonal in transverse section, the diameter being about three times that of a longitudinal section. The protoplasm lies near the walls and contains a number of chloroplastids and a single nucleus, and surrounding the latter are not infrequently a number of plastids. Some of the cells, which are either nearly isodiametric or considerably elongated, have the large vacuoles replaced by raphides and a small amount of mucilage. The

* Read before Section G of the American Association for the Advancement of Science, Pittsburg, July 3, 1902.

walls are thin and without pores, and consist, particularly the longitudinal walls, of lamellae of cellulose and cellulose-mucilage. The mucilaginous character of the wall may be readily detected in glycerin mounts of sections of material previously treated with alcoholic solution of methylene blue.

Usually between the sixth and eighth internodes from the top of the stem certain changes are observed in the character of the central pith cells. Some of the cells become more or less rounded in outline and appear to lose a part of their organized contents. The intercellular spaces become larger and with the subsequent breaking down of some of the cell walls, as well as the collapsing of some of the cells, large biconvex cavities are produced at quite regular intervals and extending to the lowest internode. These chambers are from one third to two thirds the width of the stem, and are from 1 to 4 mm. in depth. Separating these cavities are biconcave diaphragms consisting of cells similar to the other pith cells, only they contain small masses of mucilage and considerable protein matter, and in some of the cells the sap is replaced by air, giving the diaphragms a white appearance.

We have thus in *Phytolacca decandra* a pith differentiated into two parts, a peripheral portion made up of active cells, as already described, and a central portion consisting of biconcave diaphragms composed of both active and inactive cells, separated at regular intervals by cavities. The latter appear to be formed by the abstraction of water from the cells of this region as a result of the development of other parts of the stem. This view seems to be confirmed by the fact that in the process of drying that portion of the pith in the upper internodes, which is not already metamorphosed, becomes thus differentiated.

The central pith somewhat resembles the pith of certain xerophytic Compositae, and while the chambers might be looked upon as latent or neglected water reservoirs, still they do not seem to have this function.

The metamorphosed pith in *Phytolacca decandra* seems, on the one hand, to have a certain resemblance in origin to the hollow internodes of the stems of the Polygonaceae, and on the other hand to resemble the heterogeneous or modified pith of the

Magnoliaceae, with this difference, that the presence of lignin in the cells of the latter would tend to prevent the collapse and rupture of the cells to such a great extent.

The Chenopodiales being distinguished by an anomalous structure of stem and roots, as are also some of the Ranales, it is possible that a further study of the pith cells of these two orders together with those of the Polygonales will furnish additional ground for the position given these orders with reference to each other by the newer classification of Engler and Prantl.

PHILADELPHIA COLLEGE OF PHARMACY.

SHORTER NOTES

A NEW STATION FOR ISOTRIA AFFINIS.—Forty years ago, Mr. Austin discovered a new species of orchid at Closter, N. J. It was described in the fifth edition of Gray's Manual under the name *Pogonia affinis* Austin. It should now be known as *Isotria affinis* (Austin) Rydb., being a close relative of *Pogonia verticillata* (Willd.) Nutt., the type of the Rafinesquian genus *Isotria*. Specimens from Mr. Austin's original collection are the only ones that are found in the herbaria of the New York Botanical Garden and Columbia University. There are, however, records of two other stations, besides that at Closter, viz., one in Connecticut and one in southern New York. This summer, this exceedingly rare plant has turned up in an unexpected locality — at Burlington, Vermont. Mrs. Henry Holt, the rediscoverer, first wrote to Dr. Britton about her discovery and afterwards sent three fine photographs of the plant. On the back of one of these is found the following note: "Found in bloom on the first of June and did not fade till the ninth. Found in rich leaf mould with sand, at foot of old hemlock stump, in damp ground at foot of hill on our place. Ground had been cleared of quick growth of aspen, yellow birch, etc."

P. A. RYDBERG.

NEW YORK BOTANICAL GARDEN.

NEWS ITEMS

Dr. Tracy E. Hazen, for the past year director of the Fairbanks Museum, St. Johnsbury, Vt., has been appointed assistant in botany in Columbia University.

Dr. Alexander W. Evans, of Yale University, and Mr. Percy Wilson, of the New York Botanical Garden, have returned from a successful collecting expedition to Porto Rico. Most of their time was spent in the forest region of the Sierra de Luquillo.

Dr. N. L. Britton sailed for Liverpool on August 16, with the intention of spending two or three weeks at the Royal Gardens at Kew. He will give special attention to the study of the type specimens of certain American sedges preserved in the Kew herbarium.

Dr. Alexander P. Anderson has resigned his position as curator of the herbarium of Columbia University in order to devote himself to the economic and commercial development of his new method of treating cereal grains and starchy products. Several patents have recently been granted him by the United States government.

In the list of botanists visiting New York since July 1st may be noted Professors Charles H. Peck, of Albany, N. Y.; George Macloskie, of Princeton University; Edward L. Greene, of the Catholic University of America; A. S. Hitchcock, of the Bureau of Plant Industry, Washington; S. M. Coulter, of the Shaw School of Botany, St. Louis; D. S. Johnson, of Johns Hopkins University; James Fowler, of Queen's University, Kingston, Ontario; F. L. Stevens, of the North Carolina College of Agriculture and Mechanic Arts; and Harold L. Lyon, of the University of Minnesota.

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FOSSIL FERNS FROM THE LARAMIE GROUP OF COLORADO. *

BY ARTHUR HOLLICK

(PLATES 3 AND 4)

Some twelve or thirteen years ago an extensive collection of fossil plants, from the Laramie (Upper Cretaceous) Group of Colorado, was made by Messrs. George Hadden and R. C. Hills, for the late Dr. J. S. Newberry. This collection is now in the paleobotanical museum of the New York Botanical Garden, and, although partly labeled, was never reported upon by Dr. Newberry.

Included in the collection are a few ferns, most of which are more or less rare and some of them apparently represent undescribed species or varieties. Of these the following have been selected as noteworthy:

Anemia supercretacea sp. nov.

General form of frond, also nervation, unknown; pinnae delicate, narrowly conical in outline, gradually tapering to the tips; pinnules entire, lower ones spatulate, distinct, somewhat decurrent along and forming acute angles with the rachis, upper ones often more pointed or becoming confluent and forming toothed or crenulated tips to the pinnae. Plate 3, Figs. 6, 7.

In reddish shaly sandstone, Florence, Colo.

Anemia robusta sp. nov.

General form of frond, also nervation, unknown; pinnae (?) linear in outline, about 3 cm. in width; pinnules entire, ovate to subspatulate, with blunt wedge-shaped tips, about 2.5 cm. in

* Read before the Botanical Society of America, Pittsburg Meeting, July 1, 1902.

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length by 12 mm. in width, more or less confluent or decurrent along the rachis, each one provided with a weak midvein. Plate 3, Fig. 1.

In grayish sandstone, Florence, Colo.

ASPLENIUM MAGNUM Knowlton, Monog. U. S. Geol. Surv. **32**: 667. *pl. 79. f. 5–8a*

I have figured these specimens for the reason that they show some slight differences or variations from the type figured by Knowlton. In ours the pinnae are more deeply dissected, so that the pinnules are more distinctly separated and are merely confluent close to the rachis. They are also somewhat more pointed and falcate in outline. Plate 4, Figs. 1, 2.

In general appearance they both resemble *Aspidium Kennerleyi* Newb. (Boston Jour. Nat. Hist. **7**: 513. 1863; Monog. U. S. Geol. Surv. **35**: 11. *pl. 16. f. 4, 5.* 1898), which differs chiefly in the pinnules, for the most part, being finely denticulate near their extremities, although "sometimes entire," according to the description.

Fig. 1 in reddish shaly sandstone, Fig. 2 in black carbonaceous shale, Florence, Colo.

Acrostichum Haddeni sp. nov.

General form of frond unknown; pinnae (?) apparently 20 cm. or more in length by about 3 cm. in maximum width, narrowed to acute tips and with coarsely crenulate-serrate margins; nervation consisting of a series of alternate pinnately arrranged veins, extending from the rachis to the extremities of the serrations, with the spaces between occupied by a network of fine nerves. Plate 4, Figs. 3–6.

Named for Mr. George Hadden, the collector.

Figs. 3, 5 and 6 in grayish sandstone, Walsenberg Colo.; Fig. 4 in gray shale, Florence, Colo.

Polystichum Hillsianum sp. nov.

General form of frond unknown; pinnae (?) linear-oblong in outline, about 3 cm. in maximum width, narrowed to 18 mm. at the base, deeply pinnatifid; pinnules entire, linear to subfalcate in outline, blunt-pointed or obtuse at apex, alternately disposed and confluent along the rachis; nervation pinnate, consisting of

a series of primary nerves extending from the rachis to the extremities of the pinnules and numerous secondary nerves, once forked. Plate 4, Fig. 7.

Named for Mr. R. C. Hills, largely through whose efforts the collection was acquired.

In reddish shaly sandstone, Florence, Colo.

Gleichenia rhombifolia sp. nov.

General form of frond, also nervation, unknown; pinnae linear in outline, acute, about 5 mm. in width, composed of subquadrate pinnules, the lower ones distinct, acute and curved inward at the tips, the upper ones becoming confluent or closely approximated and all of nearly uniform length, giving to the pinnae a delicate, ribbon-like appearance. Plate 3, Fig. 3.

In reddish shaly sandstone, Florence, Colo.

GLEICHENIA DELICATULA Heer (?), Fl. Foss. Arct. **3**^{2}: 54. *pl. 9. f. 11e; pl. 10. f. 16, 17*

This specimen agrees quite satisfactorily with Heer's Fig. 11e above quoted, but not so closely with his other figures, which show pinnae broader at their bases and not so uniform in width throughout as in ours. Further than this, if we determine these to be identical this determination would infer a very extensive vertical range for the species, a range which we would hardly be justified in assuming without question, upon such meager evidence as that afforded by the single fragment represented by our specimen, although there would be no inconsistency in identifying a species from the Kome beds with one from the Laramie. Plate 3, Fig. 4.

In reddish shaly sandstone, Florence, Colo.

PECOPTERIS (CHEILANTHES) SEPULTA Newb. (?) Monog. U. S. Geol. Surv. **35**: 12. *pl. 62. f. 5, 5a, 6.* 1898

Pecopteris (*Phegopteris*) *sepulta* Newb. Proc. U. S. Nat. Mus. **5**: 506. 1883.

After some hesitation I have finally decided to refer our specimen provisionally to this species. The differences are slight and the resemblance is so close that a distinction seems hardly to be warranted. Plate 3, Figs. 5, 5a.

Newberry's figures show the pinnae at the extremity of the frond to be either entire or wavy-margined and confluent along the rachis, while lower down they are subdivided into more or less distinct pinnules and are apparently separated from each other, although the basal pinnules are attached to the rachis.

The only difference on the part of our specimen is that the basal pinnules are free; but this may be and probably is due to its representing a yet lower portion of a frond than is depicted in either of Newberry's figures, which in themselves indicate a transition to a base similar to ours.

The reference to the Paleozoic genus *Pecopteris* will doubtless be criticised on general principles, but rather than add to the synonymy I have thought it best to adhere to the name last used by Dr. Newberry.

In grayish sandstone, Walsenberg (?),* Colo.

Stenopteris (?) **cretacea** sp. nov.

General form of frond unknown, but apparently large and strong; each pinna or branch consisting of a broad-winged rachis, with relatively remote, entire, strap-shaped pinnules, each of which is traversed by a strong midvein from base to apex; secondary nervation unknown.

The fragmentary nature of our specimen renders accurate comparison difficult and it is possible that it might equally well be considered under the genus *Thaumatopteris*, hence the generic reference is questioned.

In reddish shaly sandstone, Florence, Colo.

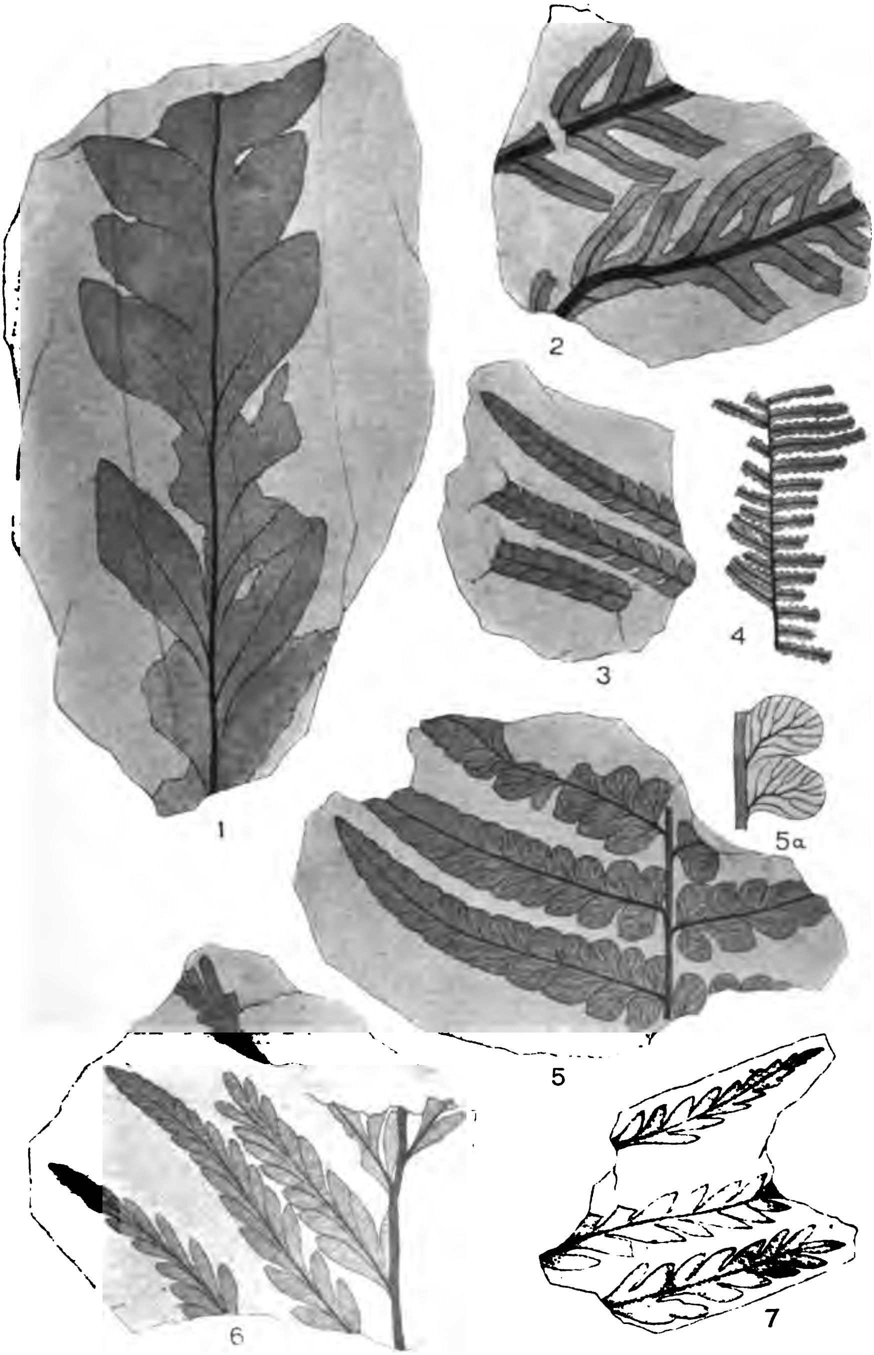
Explanation of Plates

Plate 3. Fig. 1. *Anemia robusta* sp. nov.; Fig. 2. *Stenopteris* (?) *cretacea* sp nov.; Fig. 3. *Gleichenia rhombifolia* sp. nov.; Fig. 4. *Gleichenia delicatula* Heer (?); Figs. 5, 5*a*. *Pecopteris* (*Cheilanthes*) *sepulta* Newb. (?); Figs. 6, 7. *Anemia supercretacea* sp. nov.

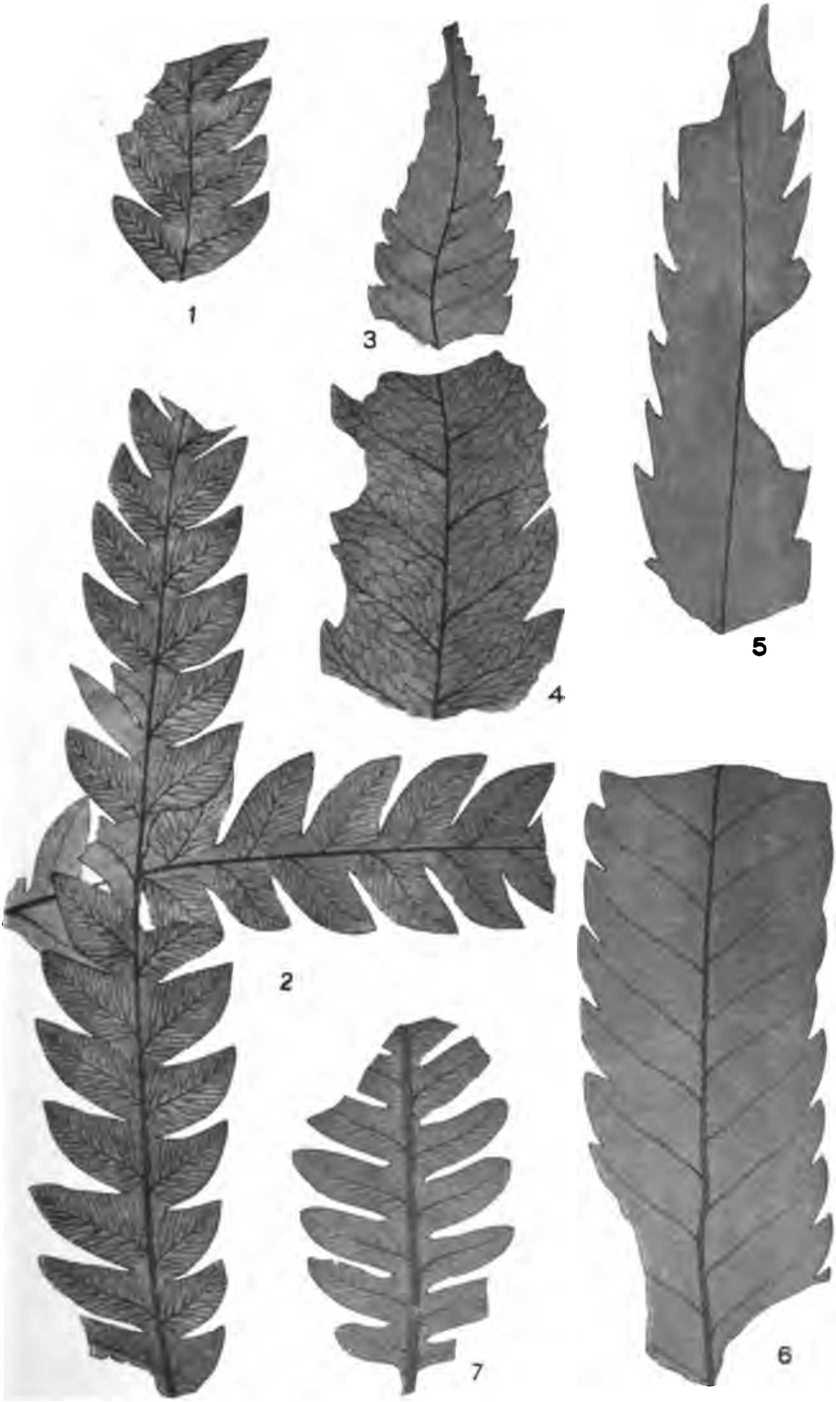
Plate 4. Figs. 1, 2. *Asplenium magnum* Knowlton; Figs. 3–6. *Acrostichum Haddeni* sp. nov.; Fig. 7. *Polystichum Hillsianum* sp. nov.

New York Botanical Garden.

* The label denoting the locality was not found, but the matrix is lithologically identical with that of the Walsenberg specimens.



FOSSIL FERNS FROM COLORADO.



FOSSIL FERNS FROM COLORADO.

CALOGLOSSA LEPRIEURII IN MOUNTAIN STREAMS

By Marshall A. Howe

In 1850, Dr. C. Montagne * described as new several species of red algae from mountain streams in French Guiana, referring three of them to the genus *Bostrychia*, one to *Gymnogongrus*, and one to *Ballia*; another species referred to the genus *Ballia* had already been described from the same region by Kützing. As the two last-named genera had been considered exclusively marine and as the members of the first-named, . ough typically inhabitants of brackish waters, were not elsewhere known to occur beyond the influence of the sea, Montagne naturally expressed surprise at the undoubted existence of these plants in running fresh water 40 kilometers or more from the sea and at altitudes ranging from 100 to 200 meters. But Montagne's species of *Gymnogongrus* has since become the monotype of a new genus *Sterrocladia*, placed in the fresh-water family Lemaneaceae, and the three species of *Bostrychia* have been considered by J. G. Agardh to be forms of a single species, *B. Moritziana*, previously described from the Antilles. Little has apparently been added to our knowledge of the two species referred to *Ballia*.

In the winter of 1890–'91, Professor K. Goebel collected four species of red algae — *Caloglossa Leprieurii* (Mont.) J. Ag., *Catenella impudica* (Mont.) J. Ag., *Bostrychia Moritziana* (Sond.) J. Ag. and *Bostrychia Calliptera* Mont. — on the roots of mangroves at the mouth of the Barima, British Guiana.† The surrounding water had not the slightest saline taste. Later, one of these species, *Bostrychia Moritziana*, was collected by Goebel in an inland cataract, and he considers its occurrence inland and in fresh water at the mouth of a river as evidence that this plant of marine affinities has gradually accustomed itself to water less and less brackish until it has finally become able to thrive in pure fresh water at a considerable distance from the sea, thus

* Ann. Sci. Nat. III. 14 : 283.

† Flora, 83 : 436–444. 1897.

answering in a measure Montagne's query as to how the algae described by him came to be in the mountains of French Guiana. Goebel then inquires why, of the four species found by him in fresh water at the mouth of the river, only one, *Bostrychia Moritziana*, appears to have wandered up-stream, alluding, however, to the reported occurrence of *Caloglossa Leprieurii* far up the Hudson River [at West Point].* He remarks upon the incompleteness of our knowledge of the interesting stream-flora of Guiana and considers it not at all improbable that one or another of the three other species named, for example, the *Delesseria* [*Calogossa*], may yet be found to have wandered inland. Already, however, nine years before Goebel's notes were published, Dr. Ferdinand Hauck had reported † the occurrence of *Caloglossa Leprieurii* on stones in a brook in the Sierra de Luquillo of Porto Rico. There, also, it was recollected on July 20, 1902, by Mr. Percy Wilson, of the New York Botanical Garden, who states that it was abundant on stones in a single stream but was not noticed in other streams of the region. The locality was about 12 kilometers from the sea, and the elevation, according to estimates by Mr. Wilson and by Professor A. W. Evans, of Yale University, may be conservatively placed at from 400 to 500 meters. The water, as would be expected, was entirely fresh to the taste. The specimens agree perfectly with those collected in the same mountains by Sintenis and referred to *Caloglossa Leprieurii* by Hauck. The species was originally described by Montagne‡ from two specimens collected in French Guiana, one growing on maritime rocks near Cayenne, the other creeping on culms of grasses reached by the high tide not far from the mouth of the river Sinnamari. The Porto Rican specimens are wholly sterile, so far as the writer can discover, and there seems to be no reliable way of distinguishing them specifically from a specimen of *Caloglossa Leprieurii* from Cayenne — evidently typical, if not an actual co-type — in the herbarium of Columbia Univer-

* Mr. George Skene, of the New York Botanical Garden, is authority for the statement that the water of the Hudson River at West Point is, at flood tide, decidedly salt to the taste.

† Engler's Bot. Jahrb. 9 : 461. 1888.

‡ Ann. Sci. Nat. II. 13 : 196. 1840.

sity. The Porto Rican fresh-water plants are, however, somewhat narrower and the cells are slightly larger. Adventitious branches from the dorsal surface at the nodes are found in plants from both regions, but are met with more frequently in those from Porto Rico.

Caloglossa Leprieurii, as commonly understood, has a wide distribution, ranging northward from South America to the Hudson River, occurring chiefly in tidal rivers. As collected about New York and at West Point, it is considerably narrower than the type, but does not seem to differ otherwise. Specimens taken at West Point were identified as "*Delesseria Leprieurii*" by Montagne himself according to a note by Professor J. W. Bailey in the Columbia University herbarium. What has been believed to be the same species has been attributed at various times to New Zealand, Ceylon, Calcutta, and other distant parts of the world. And three species of this genus, more or less resembling *C. Leprieurii*, have been described from fresh water, viz., *Caloglossa Beccarii* (Zanard.) De-Toni, from Borneo; *C. Amboinensis* (G. Karst.) De-Toni, from the island of Amboina; and *C. Zanzibariensis* (Goebel) De-Toni from Zanzibar. As all the other members of the family to which *Caloglossa* belongs are exclusively marine, so far as is known, it seems fair to assume that all the species or forms of this genus inhabiting pure fresh water have had a marine origin in times comparatively recent from the evolutionary point of view. Karsten,* in discussing his Amboina plant from this standpoint states that the streams in which he collected it (at an altitude, often of "mehrere hundert Fuss") have a rapid fall to the sea and offer a transition in salinity too abrupt to be readily overcome. Therefore, instead of assuming a direct wandering up-stream under conditions practically such as exist at present, he suggests the possibility that the plant has been lifted out of the ocean in the course of the elevation of the island itself. In Amboina, an abundance of coralline blocks at an altitude equal to that of the *Caloglossa* stand as witnesses that an elevation of the island has taken place. Goebel, however, in discussing the biological relations of *Bostrychia Moritziana*,

* Bot. Zeit. 49: 270. 1891.

assumes a direct migration inland, the plant becoming gradually accustomed to a decreasing salt-content of the water, and aquatic animals, birds, etc., being the agents by which dissemination up stream beyond the reach of the tide is accomplished.

Caloglossa Leprieurii has been made the subject of an able and detailed morphological monograph by the late Professor Cramer, of Zurich, based upon material from New York and Ceylon. It may be remarked incidentally that this plant is a most elegant object, from the pedagogical standpoint, for the demonstration and study of the development of a thallus from an apical cell.

A KEY TO THE NORTH AMERICAN SPECIES OF LACTARIUS—II *

By F. S. Earle

Subsection Piperati

1. Milk white, changing to cream-color or yellow. 2.
   Milk white, unchanging. 3.
2. Pileus yellowish-white, tomentose; stipe solid, velvety. *L. subvellereus* Pk.
   Pileus yellowish flesh-color, spotted; stipe hollow, glabrous. *L. chrysorrheus* Fr.
3. Pileus white or whitish or tinted. 6.
   Pileus reddish-brown, 1–2.5 cm.; stipe white. *L. parvus* Pk.
   Pileus grayish-brown, with shades of lilac. 4.
   Pileus dark brown, fuliginous or umbrinous. 5.
   Pileus dark green, very acrid. *L. atro-viridis* Pk.
4. Lamellae distant, yellowish, not staining. *L. pyrogalus* (Bull.) Fr.
   Lamellae crowded, flesh-color, staining greenish. *L. varius* Pk.
5. Pileus convex-umbilicate, rivulose-floccose; stipe 2.5 cm. *L. umbrinus* (Pers.) Fr.
   Pileus infundibuliform, dry, not polished; stipe 3–8 cm. *L. plumbius* (Bull.) Fr.
6. Pileus villous or tomentose, at least on the margin. 7.
   Pileus glabrous. 10.
7. Lamellae crowded. 8.
   Lamellae distant. 9.
8. Pileus white, then orange, silky-villous. *L. villosus* Clem.
   Pileus white to pale ochracous, glabrate, margin silky. *L. involutus* Soppitt
9. Pileus white, persistently tomentose; spores nearly smooth. *L. vellereus* Fr.
   Pileus white, often spotted, becoming glabrate; spores rough. *L. deceptivus* Pk.

* Continued from page 141.

10. Lamellae densely crowded, narrow. 11.
Lamellae distant or subdistant, broader. 12.

11. Stipe long, 5–10 cm., slender, stuffed; lamellae horizontal. *L. pergamenus* (Swartz) Fr.
Stipe short, 2–5 cm., thick, solid; lamellae arcuate. *L. piperatus* (Scop.) Fr.

12. Pileus thin, 3–7 cm., pure white. *L. albidus* Pk.
Pileus thick, larger, reaching 15–20 cm., tinted flesh-color. 13.

13. Stipe short, 3–4 cm., solid. *L. flexuosus* Fr.
Stipe long, 10–15 cm., hollow. *L. platyphyllus* Pk.

Section Dapetes

1. Milk blue. *L. Indigo* (Schw.) Fr.
Milk some shade of red or yellowish-red. 2.

2. Pileus white, dry, velvety. *L. salamoneus* Pk.
Pileus orange, zonate, viscid. *L. deliciosus* (L.) Fr.
Pileus some shade of gray with blue, green or purple shades. 3.

3. Milk reddish-brown; flesh unchanging. *L. subpurpureus* Pk.
Milk reddish-yellow; flesh changing to blue or green. *L. Chelidonium* Pk.

Section Russularia

1. Pileus viscid. 2.
Pileus squamulose, tomentose or pruinose, at least when young. 4.
Pileus polished, glabrous from the first. 16.

2. Milk white, changing to yellow. *L. thejogalus* (Bull.) Fr.
Milk white, unchanging. 3.

3. Pileus 5–8 cm., reddish-brown or nearly cinnamon. *L. quietus* Fr.
Pileus 6–15 cm., pallid, pale yellowish or reddish. *L. pallidus* (Pers.) Fr.

4. Milk white, changing to yellow; pileus brown. *L. subtomentosus* B. & Rav.
Milk white, changing to red;* pileus pallid, pruinose. *L. fuliginosus* Fr.
Milk white, unchanging. 5.

5. Lamellae distant. 6.
Lamellae more or less crowded. 8.

6. Pileus fuliginous; lamellae white. *L. Gerardii* Pk.
Pileus yellowish-red or yellowish-brown; lamellae yellowish. 7.

7. Pileus small, 4 cm., yellowish-red, pulverulent. *L. hygrophoroides* B. & C.
Pileus larger, 5–10 cm., yellowish-brown, tomentose. *L. distans* Pk.

8. Pileus pruinose, not at all pubescent. 9.
Pileus at first pubescent, then glabrate. 10.
Pileus persistently pubescent or squamulose. 12.

9. Pileus milky brown then reddish-orange; stipe orange. *L. saccharinus* Johns.
Pileus dull yellow; milk very abundant, staining the plant. *L. luteolus* Pk.
Pileus fuliginous, plicate-rugose, 5 cm. or more. *L. lignyotus* Fr.
Pileus fuliginous, plicate-rugose, 2.5 cm.; stipe only 4 mm. thick. *L. lignyotus tenuipes* Pk.

* *Lactarius lignyotus* in Europe is said to have milk turning reddish, but the American plants that have been referred to this species do not have this character.

10. Pileus infundibuliform, bay-red; spores 6–8 μ. *L. rufus* Fr.
Pileus plane or subdepressed, golden brown; spores 8–10 μ. 11.

11. Pileus smooth, soon glabrate. *L. volemus* Fr.
Pileus rugose-reticulate, especially on the margin. *L. volemus subrugosus* Pk.

12. Pileus rugose-reticulate, dark chestnut; spores 10–12 μ. *L. corrugis* Pk.
Pileus smooth, not rugose-reticulate. 13.

13. Stipe concolorous. 14.
Stipe of a different color from the pileus. 15.

14. Pileus and stipe grayish-white, small, 1–4 cm. *L. griseus* Pk.
Pileus and stipe reddish-allutaceous, larger, 8–15 cm. *L. aquifluus* Pk.

15. Pileus grayish-brown, often violet-tinted, 2.5–8 cm.; stipe pallid, pubescent. hollow or stuffed. *L. glycyosmus* Fr.
Pileus olivaceous, 2.5 cm.; stipe white, solid. *L. alpinus* Pk.

16. Stipe white; pileus brown; milk none [*Russula ?*]. *L. illachrymans* B. & Rav.
Stipe concolorous or subconcolorous. 17.

17. Flesh white, changing to brownish flesh-color. *L. fumosus* Pk.
Flesh not changing color. 18.

18. Stipe with white strigose hairs at base. *L. paludinella* Pk.
Stipe glabrous or subpruinose. 19.

19. Pileus golden or golden brown; stipe orange. *L. mitissimus* Fr.
Pileus some shade of reddish-brown or chestnut. 20.

20. Milk scanty, color of watered silk; stipe solid. *L. serifluus* (DC.) Fr.
Milk white, not watery. 21.

21. Pileus hygrophanous, zonate when moist, azonate when dry, 5–10 cm. *L. mutabilis* Pk.
Pileus not hygrophanous. 22.

22. Pileus subzonate, aromatic, especially on drying. *L. camphorarus* (Bull.) Fr.
Pileus azonate, not aromatic. 23.

23. Pileus reddish-brown, margin even; stipe subpruinate. *L. subdulcis* (Bull.) Fr.
Pileus bay-red, shining, margin inflexed, crenulate. *L. subdulcis badius* Gillet
Pileus cinnamon-red, somewhat shining. *L. subdulcis cinnamomeus* Gillet
Pileus dull chestnut-red. *L. subdulcis rufus* Gillet

New York Botanical Garden.

SOME NEW MEXICO PLANTS

By T. D. A. Cockerell

Astragalus simulans sp. nov.

Similar to *A. mollissimus* in general appearance and manner of growth. Leaves about 150 cm. long, pinnate, with 8–13 pairs of oval leaflets, about 14 mm. long and 8 broad, silvery on both

sides with long appressed white hairs. Flowers about 15–18 in a head about 50 mm. long, on pedicels about 2.5 mm. long, with hairy linear bracts about 7 mm.; flower about 17 mm. long and only 5 broad; calyx hairy, its tube about 8 mm. with five linear lobes about 5 mm. Standard narrow, the sides folded upwards, the expanded portions all deep magenta, the hidden whitish. Wings long and narrow, surpassing keel by nearly 3 mm., magenta, with the terminal portion broadly white. Keel pale magenta with the margin whitish, apex deeply emarginate. One free stamen. Peduncles densely white-hairy, the pubescence subappressed and interwoven. Pod oblong, thick, pointed, about 20 mm. long, 6.5 broad, 5 high, curved upwards, sulcate (not very deeply) only on dorsal side, more or less speckled with red, sometimes so much as to appear red except basally, quite glabrous, 2-celled by the intrusion of the dorsal suture, which touches but does not unite with the ventral. Pods on pedicels about 3 mm. long.

Stony hills at Las Vegas, New Mexico, growing in clumps, May 18, 1901 (*T. D. A.* and *W. P. Cockerell*). The fruiting stems become at length depressed and buried in the soil. At the same place grow *Astralagus accumbens* Sheld. and *Potentilla subviscosa* Greene, these kindly identified for me by Dr. Rydberg. The type of *A. simulans* is in herb. N. Y. Botanical Garden.

Aragallus pinetorum Veganus var. nov.

Similar to *A. pinetorum* Heller (1899), but only 1.5–1.75 dm. high, and the flowers white, the keel with a pair of large purple blotches within, showing through to the outside; middle of standard with a pair of faint purple patches.

Heller's larger plant, with white unspotted flowers, occurs at a much lower altitude, in the pine region. *A. pinetorum Veganus* was very abundant in one locality only, an exposed treeless limestone outcrop on the top of the Las Vegas Range, above the Sapello Canyon at about 11,000 feet. It was discovered on June 26, 1901, by Mr. Fabian Garcia, and on the following day I spent some time on the spot studying the plants. The flowers were observed to be visited by *Bombus* and by *Pyrameis cardui*, while the beetle *Cantharis Nuttallii* was feeding on the leaves. The type of *A. p. Veganus* is in the herb. N. Y. Botanical Garden; I am indebted to Dr. Rydberg for the recognition of its relationship with *A. pinetorum* of Heller.

The following plants also were collected on the top of the Las Vegas Range (11,000 feet), and have been determined by Dr. Rydberg: *Ranunculus micropetalus* (Greene) Rydb.; *Draba streptocarpa*, A. Gray, alpine form; *Anemone globosa* Nutt.; *Saxifraga austromontana* Wiegand; *Androsace pinetorum* Greene; *Polemonium delicatum* Rydb., unusually large; *Antennaria aprica* Greene. Most of them, at least, must be new to the flora of New Mexico.

PAROSELA JAMESII (T. & G.) Vail.—Coulter, in the Botany of Western Texas, says of this species: "flowers purple with a yellowish standard." In the Wheeler Survey Botany the petals are said to be yellowish or rose-color, scarcely exceeding the calyx. As a matter of fact, the flowers are entirely bright canary-yellow, turning ferruginous as they fade. The keel much exceeds the calyx. The plant is very common at Las Vegas, N. M., flowering early in June. Las Vegas specimens have been carefully compared with the type of *P. Jamesii* by Miss A. M. Vail, and she writes me that there is no difference whatever; "the type has yellow flowers, some of the petals of which have faded into a brown or reddish." Perhaps the publication of this note may prevent some one from publishing *P. Jamesii* as a new species, misled by the descriptions.

EAST LAS VEGAS, N. M.

A VISIT TO OKEFINOKEE SWAMP IN SOUTHERN GEORGIA

BY ROLAND M. HARPER

(*Extracted from a Letter to Dr. John K. Small.*)

I suppose you received my card from Folkston? The afternoon of the next day Mr. Ricker and I entered the great Okefinokee, with a boat and a guide. We spent forty-five hours in the swamp, and to say that I was surprised and delighted is putting it mildly. It is certainly very different from what I expected. There is no danger or difficulty about it at all. We went in on the canal about eleven miles, which took us nearly to the middle of the swamp.

I was much pleased to find that the destruction of the swamp has been at a standstill for several years, and the flora has been scarcely injured. The sawmill is falling to decay and the canal is filling up with vegetation, such as *Eleocharis elongata*, *Pontederia*, etc. There are many sunken boats in it, of all sizes from steamboats down. The outside part of the canal is completed to the river, but the water in it runs into the swamp instead of out of it. The canal has had a tendency to make the swamp drier in places, however, by allowing the water to flow more freely.

The big game in the swamp was conspicuously absent. We saw one snake and one alligator (killed the former), but nothing bigger. The one thing that bothered us was mosquitoes, and those only at night.

I had naturally expected the swamp to be a dark gloomy place, but it is nothing of the kind. The only tree which is at all abundant is *Taxodium imbricarium* (see June *Bull. Torrey Club*), which does not give much shade; and a great deal of the swamp (at least on the east side, the west side is said to be denser) is open prairie.

The flora is much like that of any cypress pond, with variations and additions. I don't believe I found any new species in the swamp, but I got some new facts about some of the old ones. I doubt very much if there are any endemic species in Okefinokee, for from all appearances the swamp has not been in existence long enough to produce specific differences. Some of the things I got are probably varietally distinct, however.

You will be surprised to learn that *Sarracenia minor* is one of the commonest species in Okefinokee. Its name is very inappropriate there, for the leaves are rarely less than two feet long, and we measured one which was 44 inches long. In some places there are acres of *Woodwardia Virginica* with 99 per cent. of the fronds facing east (at least in the morning; perhaps they turn with the sun). We saw only four ferns in the swamp by the way, two Osmundas and two Woodwardias. We didn't even see *Polypodium polypodioides* or any epiphyte except *Tillandsia usneoides*, which grows on every tree.

Among the surprises in the swamp is a shrub which Chapman describes (if I have identified it correctly) as two or three feet high, I believe, but in Okefinokee it often climbs trees twenty or thirty feet, by a new and unheard of method, without twining, tendrils, rootlets, or anything of the kind. The shrub I make out to be *Andromeda phillyreaefolia*, and the single tree which it climbs is one which has never had any parasites, epiphytes, or anything else reported from it; viz., *Taxodium imbricarium*.

From what I have read of Dismal Swamp and seen of Okefinokee I should judge that there is some little similarity between them, but I think Okefinokee is superior from a botanical standpoint. It contains many undescribed kinds of plant communities.

BRUNSWICK, GEORGIA, August 14, 1902.

IS THE WHITE-FRUITED STRAWBERRY OF PENNSYLVANIA A NATIVE SPECIES?

By P. A. Rydberg

In 1898, Mr. C. L. Gruber, of Kutztown, Pa., sent to Dr. Britton specimens of the so-called white-fruited strawberry of Pennsylvania. In his letter Mr. Gruber wrote among other things, the following: "The berries are cream-color, of an excellent peculiar flavor unlike other strawberries, globular, flattish-globular, or conical, usually with a very short neck."

As the specimens sent were so like the European *Fragaria vesca* that I could not find any other difference than the color of the fruit and perhaps a little more glaucous lower surface of the leaves, I thought that the specimens represented some escaped white-fruited form of the cultivated "Alpine" strawberries. In my monograph of the North American Potentilleae I therefore took up the Linnaean name *Fragaria vesca alba* and applied it to the Pennsylvania plant.

At the recent meeting of the A. A. A. S. at Pittsburg I met two persons well acquainted with the flora of western Pennsylvania, viz., Mr. Shafer, of the Carnegie Museum, and Mr. O. P. Medsger, of Jacobs Creek, and both thought that the strawberry was

a native, as it is common in southwestern Pennsylvania, eastern Ohio and northern West Virginia. That it has been cultivated in the region is true, for Mr. Medsger writes to me: "My father informs me that when he was a boy nearly sixty years ago, this strawberry was about the only form cultivated in the gardens. At that time perhaps most of the strawberries now cultivated were unknown." This, however, does not solve the mystery of its origin, and any information in this line will be highly appreciated. The true *Fragaria vesca* L. is not found wild in this country and is very rare even as an escaped plant, probably because it is seldom cultivated. Its American representative, *F. Americana*, has nothing to do with the white-fruited strawberry. The fruit of the former has a long neck devoid of achenes, which is not the case with the latter. Mr. Medsger has sent me fine fruits of the Pennsylvania plant and these are essentially those of *F. vesca.* The achenes in the mature fruit are wholly superficial, the receptacle not even bearing a trace of being pitted, and the sepals are spreading. The fruits are most of them almost spherical, some only slightly elongated.

NEW YORK BOTANICAL GARDEN.

SHORTER NOTES

A MUCH-NAMED FUNGUS.—I am obliged to Mr. Shear * for calling my attention to the error made by Professor Tracy and myself in overlooking Cooke and Ellis' *Fusicladium fasciculatum* when we proposed the name *Scolecotrichum euphorbiae* for a commonly occurring fungus on different species of *Euphorbia.* As Mr. Shear points out there can be no question of the identity of the two and the specific name given by us must drop into synonymy. Unfortunately, however, other errors must be acknowledged. In *Muhlenbergia,* 1: 16. Au. 1901, I proposed the new genus *Cercosporidium* founded on this species as the type. A further examination of this material and of the numerous European specimens of *Passalora bacilligera* (Mont. & Fr.)

* Bull. Torrey Club, 29: 449. Jl. 1902.

Fresenius, the type of the genus *Passalora* Fr., in the herbarium of the New York Botanical Garden, convinces me that the two are not generically distinct. Both are biophilous, and have long, pannose, fasciculate, fuscous conidiophores, which bear the once or more septate oval or ovate conidia both acrogenously and pleurogenously. Adopting this view of the case, the name and synonymy of our fungus will stand as follows :

Passalora fasciculata (C. & E.).

Syn. : *Fusicladium fasciculatum* C. & E. Grevillea, **6** : 88. Mr. 1878.

Scolecotrichum euphorbiae Tracy and Earle, Bull. Torrey Club, **23** : 209. My. 1896.

Piricularia euphorbiae Atkinson, Bull. Cornell Univ. **3** : 40.

Cercosporidium euphorbiae Earle, Muhlenbergia, **1** : 16. Au. 1901.

Scolecotrichum fasciculatum Shear, Bull. Torrey Club, **29** : 449. Jl. 1902.

CERCOSPORIDIUM HELLERI Earle, Muhlenbergia, **1** : 16 should also be changed to **Passalora Helleri** (Earle).

F. S. EARLE.

NEW YORK BOTANICAL GARDEN.

NEWS ITEMS

Dr. N. L. Britton returned on September 13 from a visit to England.

Mr. J. A. Shafer, curator of the herbarium of the Carnegie Museum, Pittsburg, Pa., spent the month of September at the New York Botanical Garden; and H. Harold Hume, of the Florida State Agricultural College, has recently devoted a week to consulting its library.

"Forage Conditions on the northern Border of the Great Basin" by Dr. David Griffiths, "Stock Ranges of northwestern California" by Mr. Joseph Burtt Davy, and "The North American Species of *Spartina*" by Mr. Elmer D. Merrill, are titles of bulletins recently issued by the Bureau of Plant Industry.

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November, 1902

FIELD NOTES ON RHODODENDRON CATAWBIENSE

By W. A. Cannon

On Roan Mountain, North Carolina, occur four kinds of laurel, namely, the flame-colored azalea (*Azalea lutea*), the great laurel (*Rhododendron maximum*), the mountain laurel (*R. Catawbiense*) and the American or ivy laurel (*Kalmia latifolia*). I had a good opportunity to observe these plants, especially the mountain laurel, while spending the season collecting plants from the middle of June until October 1902, on the summit of Roan, and since these observations were made with comparative difficulty, it may be considered an economical measure, to record them; it is to be hoped that the facts presented although fragmentary, may not of themselves be without interest.

Where the Laurels grow

When in June a visitor to Roan alights from the train at the nearest railway station * and looks about him, he will have little difficulty in seeing the American laurel, or "ivy" as it is called by the mountaineers, which at the time is in full bloom. This rather ornamental shrub is striking and beautiful, indeed, when covered with its pink flowers. It may be seen on the banks of the Doe River all the way to the foot of the mountain, which is about 1,000 feet above the station and five miles distant from it, but it is not so abundant at a higher altitude although to be observed at 4,500 feet altitude.

Associated with the American laurel is to be found the great

* Roan Mountain on the East Tennessee and Western North Carolina R. R., 2,700 feet altitude, fifteen miles from the summit of Roan.

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laurel, but not in flower in the middle of June; it does not blossom before July. Like the American laurel, this species, as a rule, does not occur in the higher altitudes.

Both of the species just mentioned may be seen from the wagon road going to the top of Roan, but the other two occur only on the summit, or in places more or less remote from the main traveled way. I know of only two places about five miles apart on Roan, where the flame-colored azalea grows, and there it is represented by only a few specimens. In both cases the altitude is above 5,000 feet. I presume, however, it may occur in lower altitudes and in favorable, that is, warm locations.

When, on the way to the summit of Roan, Carver's Gap with an altitude of 5,400 feet is reached, the road turns sharply to the westward and ascends in several "switchbacks" through a second-growth and open balsam forest nearly to the top of Roan High Knob, which it skirts on the way to the hotel (Cloudland). It is on the side of the High Knob, among the groups of balsams, that the visitor gets his first glimpse of the mountain laurel. This is in blossom in June. The rounded shrubs, about six feet high, are covered with bouquet-like clusters of large lilac-purple flowers, which are richly set among the dark green leaves. As the hotel is reached, or, better still, if Roan High Knob is ascended, the visitor gets such a view as he is likely not soon to forget. Some distance to the westward on a rounded lower summit a huge bed of rhododendron spreads out which mounts by an easy incline to the other high eminence, Roan High Bluff. In the distance the individuality of each plant is lost, and the massing of the blossoms of thousands of shrubs produces a wealth of color on the summit, beautiful beyond description.

The leading Plant Formation on Roan

But not every rhododendron even in fruitful years is so richly laden as those just described. The abundance of flowers is primarily associated with the local distribution of the shrub, and also with other facts of significance in its biology, as with its form and duration of life. In order better to understand this, and also before going further into the subject, it may be best to

glance at the main plant formations on the mountain namely, forest, shrub and meadow.

There are two kinds of forests, deciduous and coniferous. The former, as a rule, occupies the lower reaches of the mountain, but may extend upward to an altitude of perhaps 5,800 feet. The coniferous forest, the dominant trees being Frazer's balsam and the black spruce, is found on the uppermost slopes only, extending downward into the gulches or on the northern side for a considerable distance.

The rounded summits of Roan are mainly covered either with shrubs or meadows. The shrub formation is composed of a low

FIG. I. *Rhododendron Catawbiense* growing with *Dendrium buxifolium prostratum*. The illustration shows the rounded outlines characteristic of this rhododendron.

alder, the rhododendron (*R. Catawbiense*) and the small heather (*Dendrium buxifolium prostratum*). The two former are the dominant plants, and generally these are not mixed but occur in separate areas. Between the alders and the forest the line is sharply drawn. But between the rhododendrons and the forest this is not the case and they may grow in the more open balsam woods. While small plantations of rhododendron occur here and there in the open throughout the upper reaches of the mountain, the largest area exclusively occupied by it lies between Roan High Knob and Roan High Bluff and comprises perhaps 80 acres. This is the formation which in June is so conspicuous with its mass of flowers.

The Form of R. Catawbiense

If we examine a rhododendron shrub, which is growing in the large plantation just referred to, or in any location away from the forest, and compare it with a form growing among the balsams we see certain variations in the plants themselves characteristic of the different habitats. In the first place, the shrubs in the open are not so tall, measuring 2–7 feet; they are more rounded in outline; they are more dense and branch much more richly; and in addition they flower more abundantly. The shrubs among the trees, on the other hand, are often tall, slender and extremely irregular in form, they branch but little, and they flower rela-

FIG. 2. *Rhododendron Catawbiense* with young shoots or suckers springing from the base of its branches.

tively seldom. As an example of the habit of the latter I may cite a plant of which one branch was over seven feet high and unbranched, and which had not borne a flower.

As will presently appear, the variation in habit just mentioned lies primarily in the characteristic difference in the number of flowers borne, and in the relation of the flowers to the axes of the plant.

A mature rhododendron shrub has no main stem with lateral branches, but on the contrary, is composed of several shoots likely of coördinate rank, which are of themselves branches, and

each of which may branch several times before terminating in the ultimate twigs upon which the flowers and leaves appear.

The flowers are arranged in umbels, they are terminal, and in each case they end the growth of the twig.

The leaves of each branchlet are in one, two, or rarely three interrupted groups, from four to six leaves each. The variation in the number of groups of leaves is correlated with the differences in the habitat of the plants, and varies with the time of year. Uniformly the shrubs growing among the balsams have at least one or two groups of leaves more than those away from the forest, or, in other words, the leaves on such shrubs may live one year or more longer than those on the open growing plant. In the axils of the leaves are buds, each or all of which may develop, or, as will be shown later, they may remain latent. If two or more buds grow, the respective branches which they form make a more or less wide angle with the parent branch ; if, on the other hand as perhaps most frequently happens, one only develops, the new branch turns upward and takes a direction parallel to that of the parent, pushing the flower cluster, now become the fruit, to one side. Sometimes it happens that none of the axillary buds develop, in which case of course the branch either retains its integrity, or if the terminal bud is a flower-bud, the branchlet dies. Now it happens that if a leaf-bud terminates a branchlet, the development of the axillary buds appears to take place much less frequently than when the terminal bud is destined to give rise to flowers. It thus happens that profuseness in flowering brings about wealth of branching, and since the plants in the open blossom more than in the forest, that the former are also more abundantly branched.

A peculiarity which the rhododendron grown in the open shows as regards the branching, accounts also for the rounded outline characteristic of such forms. This shape is so noticeable that, as suggested by a visitor to the mountain, the shrubs appear as if they were cropped by grazing cattle. So far as I have observed, however, they are not subject to their attack. Rather the symmetrical form is occasioned by the nearly equal and similar development of its constituent branches.

THE DURATION OF THE LIFE OF THE RHODODENDRON

We may now turn to examine the causes which determine the life limit of the average rhododendron shrub, but before doing so it will perhaps be best to review briefly the structure of the buds, both leaf and flower.

An examination of the rhododendron in August or early September, shows that the flower and leaf buds for the following year's growth are already formed, and are easily to be distinguished. The flower bud is much the larger, being about three quarters of an inch long, and relatively stout. A longitudinal section shows that the young flowers are each subtended by a relatively long bract, and that the young cluster itself is enclosed by several

FIG. 3. Branches of *Rhododendron Catawbiense* which have been cut across slightly below the surface of the ground. Young shoots springing from basal buds are shown.

overlapping scales. When the flower bud develops the latter fall away, as do the bracts also, and the basal portion of the growing flower stalk is left quite naked.

In August the leaf-bud is composed of many overlapping scales, but the young leaves may not be distinguished readily. In the following spring, however, when the leaf bud grows, it is to be observed that the basal scales early fall away, as in the flower bud, and leave that portion of the developing stem entirely

bare. It thus happens that the leaves are arranged as previously stated in interrupted groups.

How many years constitute the life limit of the average rhododendron? I put this question to myself many times as I walked among these shrubs, and found for reasons which will presently appear, that in the end I was unable to answer it satisfactorily. It should be observed that this is very different from asking the age of a branch, a thing which can very readily be estimated. For determining the latter I have selected a representative branch of an average shrub in which I was able to distinguish twenty-eight yearly increments to its length, and thirty-one annual rings of growth. From its position in relation to the other branches I thought it to be at least one of the first to develop, if it was not the primary stem, a fact I was unable to determine. Thus, that branch was at least thirty years old, whatever may have been the age of the portion from which it sprang.

One is struck by the rarity of dead rhododendrons. I have seen very few, and upon investigating the probable cause of death of these, I always found it due to some catastrophe as the washing away of the soil. Whether the rhododendron as a plant rarely dies, the twigs and branches do, and the avoidance of death by the entire plant is brought about, as will presently be seen, by the development of adventitious buds.

The duration of the life of a branch naturally depends on that of the branchlets into which it is ultimately subdivided, and the life limit of these in turn, hangs partly at least on a proper balance between the production of flowers and of leaves, and possibly also to some degree on the length of the branch itself.

In order to carry on the life of the branch any twig must produce each season at least one leaf bud, whether it gives rise to flowers or not. Thus when flowers are also formed, the branchlet has a double burden. Now it happens when the branches are relatively long, that the vegetative (axillary buds) may not develop, the flower bud only doing so, and therefore the death of the twig follows with the ripening of the fruit.

Whether both flower and leaf buds develop the same season on the same twig depends apparently on the presence of suitable and

sufficient food as one or two facts seem to indicate. In the first place, branches evidently past their prime and relatively long, bear as a rule undersized leaves, and, as given previously, on such branches, a greater per cent. of flower buds than of leaf buds, or, than of flower and leaf buds, are found to undergo development. But, secondly, if for any cause the flower bud is killed, as by late spring frosts, it invariably happens that one and generally more of the axillary buds grow into as many branchlets.

Finally it is conceivable that the death of a sufficient number of twigs, by over-production of flowers, might in the end cause

FIG. 4. Fruits of *Rhododendron Catawbiense* of the present and the past year are shown; also flower and leaf buds; and leaves of the past and the present year. The leaves are partially removed to expose the flower buds.

the death of the entire plant. This however does not occur, as will presently appear.

When the rhododendron plant has reached a certain size, or more accurately a certain stage in its life history, it begins to put out branches, or suckers from the level of the ground or near it. Precisely what the stage in the development of the shrub is, when this takes place, is not easy to determine. It is probably associated with the over-production of flowers, and the consequent suppression of the development of leaf buds and is likely therefore concerned with questions of nutrition.

The course of the development of the suckers, or secondary

branches may be outlined as follows: A few small branches may be seen to rise from the bases of the larger ones in almost any mature shrub. When the older branches may be said to reach a state of senescence, by reason of overflowering, the suckers are noticeably abundant and relatively large, and finally, by the time the twigs of the parent branch are dead, they have assumed its form, have taken on its functions and have gradually replaced it. Through the vegetative rejuvenescence the rhododendron as a plant normally does not die, and it therefore may be considered, as Muir looks upon the big tree, as practically immortal.

A KEY TO THE NORTH AMERICAN SPECIES OF CORTINARIUS.—I

By F. S. Earle

The genus *Cortinarius* is one of the largest and most interesting among the mushrooms, many of the species being of considerable size and very attractive in coloring. As a rule they are found during late summer and fall, many of them occurring after the weather has become quite cool. Many of the species are edible and so far as known none of them are dangerously poisonous.

The sections and subgenera in *Cortinarius* are for the most part quite well marked and the study of the genus is made difficult by the great number of species and our limited knowledge of them rather than by any lack of good specific characters. In this genus the study of the earlier stages as well as of the fully developed plant is unusually important. The color of the young lamellae in particular should always be noted.

It should be borne in mind, as was stated at the beginning of this series of papers, that these keys are based on the existing literature only, and not on a study of the plants themselves. They are intended solely as an aid to the beginning of the serious study of these interesting plants and not to express final convictions in regard to their relationships.

Key to the Subgenera of Cortinarius

1.	Universal veil * present when young.	2.
	Without an evident universal veil.	3.
2.	Universal veil glutinous ; the stipe consequently viscid.	*Myxacium.*
	Universal veil fibrous; stipe lanate or scaly, peronate.	*Telamonia.*
3.	Stout; pileus thick and fleshy.	4.
	Smaller and more slender; pileus thin at least at the margin.	5.
4.	Pileus viscid.	*Phlegmacium.*
	Pileus dry, often sqamulose.	*Inoloma.*
5.	Pileus dry, at first villous or hirsute, sometimes becoming glabrate with age.	*Dermocybe.*
	Pileus moist, hygrophanous, glabrous, or with marginal whitish fibrils.	*Hydrocybe.*

Phlegmacium

1.	Stipe stout, fleshy.	2.
	Stipe slender, subcartilaginous ; cortina medial.	Section *Elastici.*
2.	Stipe short, bulbous ; cortina basal attached to margin of bulb.	Section *Scauri.*
	Stipe longer, cylindrical or bulbous ; cortina superior.	Section *Cliduchi.*

Cliduchi

1.	Lamellae at first whitish or pallid.	2.
	Lamellae at first violet or purple.	5.
	Lamellae at first olivaceous.	7.
2.	Pileus pallid or alutaceous.	*C. sebaceus* Fr.
	Pileus brown with radiating gray center; stipe brown.	*C. radians* Earle.
	Pileus reddish-brown.	3.
	Pileus yellow or ochraceous.	4.
3.	Stipe spotted.	*C. maculipes* Pk.
	Stipe smooth, whitish.	*C. nudipes* Earle.
4.	Stipe attenuate below, at first scaly.	*C. clavicolor* Fr.
	Stipe equal, at first lanate.	*C. turmalis* Fr.
5.	Pileus dark-brown, fuliginous or fulvous.	*C. varius* (Schaeff.) Fr.
	Pileus light-brown or gray.	6.
6.	Stipe long, 10–15 cm.	*C. sphagnophilus* Pk.
	Stipe short, 2–5 cm.	*C. lanatipes* Pk.
7.	Pileus viscid, the margin at length revolute.	*C. infractus* (Pers.) Fr.
	Pileus glutinous, the margin strongly involute.	*C. glutinosus* Pk.

* It is unfortunate that the term "veil" is used in mycology for two entirely different things. As here used it refers to a more or less well developed external covering of the entire young plant. It is the structure which when fully developed as in *Amanita* becomes a volva. The inner veil or preferably the cortina is a fibrous or membranous covering of the young lamellae. When fully developed it remains as a permanent annulus on the stipe. In this genus the cortina is usually cobweb-like and is soon evanescent.

Scauri

1. Lamellae at first white or pallid. 2.
   Lamellae at first blue, purple or violet. 5.
   Lamellae at first yellow or brownish. 7.
   Lamellae at first olivaceous. 9.
2. Pileus dark bluish-violet, brown punctate. *C. caesius* Clem.
   Pileus light red. *C. sublateritius* Pk.
   Pileus yellow. 3.
   Pileus reddish-brown or orange brown. *C. coloratus* Pk.
   Pileus white or whitish. 4.
3. Pileus reticulate-rugose. *C. corrugatus* Pk.
   Pileus smooth. *C. intrusus* Pk.
4. Lamellae crowded. *C. albidus* Pk.
   Lamellae not crowded. *C. communis* Pk.
5. Pileus blue when young, fading to argillaceous. *C. caerulescens* Fr.
   Pileus pale ochraceous. *C. Copakensis* Pk.
   Pileus dark reddish-brown to olivaceous. 6.
6. Flesh blue. *C. purpurascens* Fr.
   Flesh yellow. *C. glaucopus* (Schaeff.) Fr.
   Flesh white. *C. calochrous* (Pers.) Fr.
7. Stipe ochraceous; pileus with red fibrils. *C. virgatus* Pk.
   Stipe white. 8.
8. Stipe silky, striate. *C. luteo-fuscus* Pk.
   Stipe smooth, shining. *C. turbinatus* (Bull.) Fr.
9. Pileus spotted; stipe striate. *C. scaurus* Fr.
   Pileus not spotted; stipe silky. *C. olivaceus* Pk.

Elastici

1. Lamellae at first white. *C. amarus* Pk.
   Lamellae at first violet-purple. *C. porphyropus* Fr.
   Lamellae at first brownish. 2.
2. Pileus reddish-yellow. *C. ophropus* Pk,
   Pileus ochraceous. *C. longipes* Pk.
   Pileus cinereous. *C. lapidophilus* Pk.

MYXACIUM

Stipes floccose, the flocci at first covered with glutin. Section *Colliniti*.
Stipes viscid, not floccose. Section *Delibuti*.

Colliniti

1. Lamellae at first white, pallid or argillaceous. 2.
   Lamellae at first yellow or brownish. *C. muscigenus* Pk.
2. Pileus orange brown. 3.
   Pileus fuscous or ochraceous. 4.
3. Lamellae at first bluish-argillaceous; stipe floccose. *C. collinitus* (Pers.) Fr.
   Lamellae at first white; stipe silky. *C. mucosus* Fr.
4. Stipe subconcolorous, floccose. *C. sphaerisporus* Pk.
   Stipe white or lilac tinted, silky tomentose. *C. elatior pallidifolius* Pk.

Delibuti

1. Lamellae at first white or pallid.	*C. splendidus* Pk.
Lamellae at first some tint of blue or violet.	2.
3. Pileus violet-purple.	*C. iodes* B. & C.
, Pileus yellow.	*C. Berlesianus* Sacc. & Cub.

TWO NEW SPECIES OF SELAGINELLA IN THE SOUTHERN FLORA

By Lucien M. Underwood

Although the number of species in the *Selaginella rupestris* group has increased from three to sixteen within the limits of the United States through the work of the writer and that of Dr. Georg Hieronymus, of Berlin, the mine does not appear to be exhausted yet. The two following species are representatives of the flora of North Carolina, the first from the sandy barrens of the coastal plain and the second from the highlands at the opposite side of the state.

Selaginella acanthonota sp. nov.

Stem and branches stout, ascending, sending out abundant rootlets from the upper portions, softly hairy at the tips. Leaves in 8–10 regular series, 2 mm. long, gradually tapering into a roughened soft white awn one half to one third their length, with about 12 short irregular cilia on either side of the dorsal groove; strobiles fully 10 mm. long, quadrangular, the sporophylls broadly triangular and ciliate like the stem leaves.

Growing in sand along the coast and near it, North Carolina. A small fragmental specimen of this species was collected many years ago by Mr. Curtis and is in the Torrey herbarium; more abundant material was collected during the summer of 1899 in pine barrens near Wilmington, by Professor C. L. Williamson and has been grown in the conservatories of the New York Botanical Garden. The plant is a close ally of *S. rupestris* but differs notably in the regularly many-ranked leaves, in the dorsal cilia, from which the species receives its name, and in other characters.

Selaginella Sherwoodii sp. nov.

Plants forming densely branched compact tree-like tufts 6–8 cm. high. Stems repeatedly branching, erect or ascending, root-

ing only at the base, rigid, about 1.5 mm. in diameter; leaves about 10-ranked, short, about 1.5 mm. long, closely appressed, grooved dorsally in the lower two thirds, ending in a slender white coiled hair 0.7–0.9 mm. long, and with 8–12 very short minute cilia on each margin; strobiles inconspicuous, less than 5 mm. long, terminal on the branches, the sporophylls similar to the ordinary leaves but wider and graduating into them; microsporangia three-lobed, the microspores pale yellow, rugose-reticulate, 0.44 mm. in diameter; microsporangia round-reniform, the microspores bright yellow, smooth, 44 μ in diameter.

Near Highlands, Macon County, North Carolina, altitude 5,000 ft. J. Donnell Smith, 1882; W. L. Sherwood, 1901 and 1902 (type in the New York Botanical Garden).

Specimens of this plant first collected by John Donnell Smith are fairly well represented in D. C. Eaton's collection and more meager specimens are in the Gray herbarium; they have hitherto been confused with *S. tortipila* A. Br. Fine plants of this beautiful species have been collected in 1901 and again in 1902 by Mr. W. L. Sherwood, and these have enabled us to draw up the above description. The plant is allied to *S. tortipila* which it resembles in the coiled or twisted terminal hairs of the leaves. *S. tortipila* was described by Alexander Braun from plants collected in 1841 by Rugel and a cotype of the species is in our herbarium. In place of the slender lax sprawling habit of *S. tortipila* with enlarged though short strobiles, we have here a very compact bushy or tree-like plant with stout stems, many-ranked leaves, and strobiles which are scarcely noticeable as the branches graduate imperceptibly into them without enlargement. There is also a fragmentary specimen of this species in the Gray herbarium collected in South Carolina also by John Donnell Smith so that the species is likely to be found at various places in the higher attitudes of the Southern Appalachians.

VACATION OBSERVATIONS. I

By Francis E. Lloyd

Displacement of Leaves.—Occasionally a maple twig is found in which the leaves are arranged in decussating whorls of threes. If we accept the explanation that decussating pairs of leaves arise

by the shortening of alternate internodes, we must see in the stem of the *Catalpa* which normally has decussating whorls of three leaves, and in the maple twigs referred to, pairs of successive reduced internodes alternating with single normal internodes. Evidence that this is the case is seen in an abnormal twig of *Acer Pennsylvanicum*, found by the writer, in which the leaves of one pair were displaced, and so removed from each other, by a distance of $\frac{1}{16}$ inch and those of the next pair by $1\frac{1}{4}$ inches. The specimen is of further interest in the fact that the leaves of the former pair were alsodis placed, but here laterally, so that they lay in two separate axial planes, instead, as in the normal condition, in one. Such a displacement must occur in twigs which normally bear paired leaves when a third appears in the whorl. In the twig here described, however, the displacement was in the wrong direction, when referred to the upper displaced leaf of the next lower pair, so that three leaves were, in this way, crowded upon one side of the twig. Had the other leaf, *i. e.*, the lower of the under pair, been the upper, the relation would have then been, as one would have expected, regular.

The use of Wings in the Fruit of Acer.—The generally accepted view concerning the use of the wings in the fruit of *Acer* is that they serve as organs of flight to aid in dissemination. It is not impossible that they serve some other function, and I have endeavored to determine whether, during the development of the embryo, they may be of use in manufacturing foods for its nutrition. A certain amount of anatomical evidence is present to indicate that this is the case. Thus the venation appears to be so disposed as to serve for the translocation of solutions toward the embryo; and the minute structure, both as regards the stomata and the mesophyll, is very like that of a non-dorsiventral leaf, such as that of *Lactuca scariola*, or the phyllodia of various plants. There is but little development of spongy parenchyma; otherwise the organ is quite leaf-like.

By applying the iodine test it was shown that the wings are very active in the making of starch during the day, and, as in leaves, the materials accumulated during daylight suffered translocation. On the supposition that this movement of the starch

was directed toward the embryo, and ultimately reached it, the wings were removed from several dozen fruits with embryos in early stages of development. It was expected that the embryos of these fruits would show some signs of malnutrition, but as a matter of fact none did so, showing without doubt that the hypothesis toward the testing of which the experiments were directed was false. It would appear that, if the substances which are formed in the wing are of any use to the embryo, their amount forms no important part of the food supply. It may be possible that there was some compensation of some sort, but that is not very likely. So that for the present we may adhere to the view that these organs serve a useful turn after the close of their development; and their origin, if this is true, may be explained, so far as our present knowledge takes us, only by the workings of natural selection. The whole subject of the exact function of wings in fruits is open to investigation, for it is clear that the wings which occur in dehiscent fruits cannot be interpreted in the same fashion as those in indehiscent fruits.

SHORTER NOTES

NOTE ON THE "REPORT OF THE BROWN-HARVARD EXPEDITION TO NACHVAK, LABRADOR."*—Dr. E. B. Delabarre, of Brown University, in listing the Hepaticae collected on this expedition to Labrador, states that "all seven of the hepatics here named are now reported for the first time, although three of these names can be given as yet only provisionally," and in a later note remarks, "none of these are reported by the previously-named authorities, nor by W. H. Pearson in his *List of Canadian Hepaticae* (1890)." The "previously-named authorities" do not appear to include any American students of the Hepaticae and Dr. Delabarre has evidently overlooked the most complete list of Labrador Hepaticae yet published, a list of thirty-one species collected by the late Rev. A. C. Waghorne and Mr. O. D. Allen and published by Professor Underwood in the *Bulletin of the Torrey Botanical Club* in 1892 (**19**: 269). Four out of the seven of Dr. Delabarre's list are reported by Professor Underwood.

MARSHALL A. HOWE.

* Bull. Geog. Soc. Phila. 3: 167–201. 1902.

THE HABITAT OF THE SLENDER CLIFF-BRAKE.—In the last two numbers of *The Fern Bulletin*, reports have been published of the occurrence of the slender cliff-brake [*Cryptogramma Stelleri* (S. G. Gmel.) Prantl, *Pellaea gracilis* (Michx.) Beddome] on sandstone rocks, and the editor comments that it seems not to have been collected previously from other than limestone rocks. I think that it will be found that this fern grows not infrequently on other than limestone formations here in the East. The most luxuriant and abundant growth that I have ever seen was in Au Sable Chasm, New York, where it is found on a strongly siliceous sandstone with no limestone in the vicinity. There are at least two stations for this fern in the region of Mount Mansfield, Vermont, where the rocks are almost entirely gneissoid in character. In 1896 I found it in Nebraska Notch, and last year Mr. W. R. Davis, of Boston, collected it on Sterling Mountain. At St. Johnsbury it grows on a mica-schist formation far removed from limestone; the rock is considerably eroded, and more soil surrounds the plants than at any other station known to me. In August I collected this fern also on mica schist in Quechee Gulf, a remarkable gorge in the town of Hartford, Vermont, which is perhaps most noteworthy from a botanical standpoint for producing *Woodsia glabella* and *W. alpina* at the elevation of no more than four hundred feet above sea level.

ST. JOHNSBURY, VT. TRACY E. HAZEN.

NEWS ITEMS

The International Conference on Plant Breeding and Hybridization held at New York from September 30 to October 2, brought to the city a large number of botanists and horticulturists. Among the distinguished foreigners present were Mr. W. Bateson from Cambridge, England; Daniel Morris, Imperial Commissioner of Agriculture for the British Colonies at Barbadoes; Hon. William Fawcett, Director of the government plantations in Jamaica; and Mr. George Nicholson, curator of Kew Gardens, England. Papers were presented by Professor L. H. Bailey, O. F. Cook, W. M. Hays, S. A. Beach, T. V. Munson, William Saunders, and others; the program was especially interesting and provoked much discussion of the mutation theory.

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TORREYA

December, 1902

VACATION OBSERVATIONS—II

By Francis E Lloyd

Propulsion of Gemmae in Lycopodium lucidulum.—Leavitt * reports that the gemmae of *L. lucidulum* may be thrown to a distance of 3 to 4 feet. He induced the propulsion by pressing down gently at the extreme edge of the cotyledon-like leaf of the gemma. It is further suggested that in nature the gemmae must be struck by some object such as a moving plant or animal, or a rain drop, in order that the tension set up by the tissues of the clasping organ may be utilized for the expulsion of the gemma.

Having found a patch of gemmiparous plants at Northfield, Mass., early in September, I was led to repeat the experiments of Leavitt, at first by the method which he used, as above described, a method which I had used earlier in the case of *L. Selago* in the Austrian Tyrol.† It soon occurred to me, however, that there was a better way of doing it, possibly imitating the condition in nature more closely, namely by pinching the gemmiparous branch at its base in such a manner as to exert a slight pressure upon the leaves which clasp the gemma. It became possible in this way to set free the gemma without interfering in any way with its flight. By holding the plant near the ground on a level spot, so as not to give it any advantage of elevation, I found that the maximum flight reached somewhat over three feet, though in the majority of cases the range fell within fifteen inches. The trajectory, moreover, is markedly curved, falling in

* Leavitt, R. G. Notes on *Lycopodium*. Rhodora, 4: 57–60. Mr. 1902.

†Lloyd, F. E. Observations on *Lycopodium*. Torreya, 2 : 20, 21. F. 190 .

[The exact date of publication of each issue of Torreya is given in the succeeding number. Vol. 2, No. 11, comprising pages 161–176, was issued Nov. 25, 1902.]

the most striking instances from four to six inches in three feet. According to Leavitt, the longest horizontal distance of flight measured by him was 25 inches, though he adds : "The range of the trajectory *may* be three or four feet, *at the greatest.*" (Italics mine.)

Now, assuming that the normal range of flight for these gemmae is three feet, and that they fall only four inches in that distance, which gives us very favorable data for an estimate, the gemmae shot out from the 'up side' of a plant growing on a slope with one foot rise in three, would reach a distance of only about sixteen inches, measured on the slope, even if we assume a horizontal flight. If the plant be tilted so that its axis is at right angles to the slope, the force which would carry the gemma to a distance of three feet, with a vertical rise of one foot, would carry the object approximately six feet, horizontal distance, a conclusion quite at variance with the observed facts.

It would seem strange, too, that the gemmae which Leavitt saw were to be found only in *one* direction from the nearest adult plants as it is well enough known that they grow out in various positions on the stems.* An examination of these plants would have shown the basal parts of the gemmiparous branches, and Leavitt's conclusion may thus have been tested. To be sure, there is also the possibility that the conditions in other directions were not favorable for germination ; but in the absence of definite evidence to the contrary we must assume that they were. There is, therefore, a considerable degree of probability that the plantlets referred to had some other origin.

Finally, the supposition that in order to initiate the propulsion of the gemma it must be struck by some moving object, may be beyond the facts. We may as justifiably assume that the mechanism is complete in itself, and that the tensions set up in the clasping leaves are sufficient to cause the phenomenon. Our observations touching this point are incomplete, and it is therefore better to hold the judgment in abeyance.

Movements of Leaflets in Onoclea sensibilis.—The statement

* Goebel has pointed out in the Organography (p. 651) that the gemmae do not grow on the side of the stem turned toward the sister stem of a fork but this, of course, does not affect our statement.

made by Amos Eaton in his botany published in 1824, that the leaflets of *Onoclea* "slowly approach each other on squeezing the stem with the hand," * prompted me to determine, if possible, what basis of fact there might lie beneath it.

Accordingly an attempt was made, in rather crude fashion, to be sure, to determine whether there was any movement rapid enough for ready observation. I was encouraged to do this by the experience which I had in noticing that the lowermost leaflets did approach each other sensibly within a period of ten minutes after plucking.

A series of experiments was carried out by cutting off the petioles of the leaves desired close to the ground, and pouring on water to prevent the entrance of air into the tissues in the event of negative pressure. Some were then measured by taking the distance between the tips of the bottom pair of leaflets, and between the tip of one of these and the apex of the leaf. The latter measurement proved of no value, since the twisting of the whole leaf vitiated the results. After measurement a few were allowed to stand in water, and others allowed to dry, and in the latter the movement of the leaflets was usually to be noted in five minutes although in some cases negative results only were obtained. Those remaining in water, on the other hand, usually remained fresh and showed no movement. The measurements of a few cases of leaves allowed to remain out of the water are given.

Time	9.55	10	10.02	10.15	10.55
Distance between tips of leaflets in inches.	2⅝ 3¾	2⅛ 3½	2 3½	1⅝ 3⅜	⅞ 2½
Time.	10.40	10.45	10.50	11.30	
Distance between tips of leaflets in inches.	2¾ 3⅛ 3½	2⅝ 2⅞ 3¼	2½ 2¾ 3⅛	1½ 1¾ —	

* My attention was drawn to this statement of Eaton's by a paragraph, written by Miss B. L. Putnam in the Fern Bulletin, 7 : 15. Ja. 1899.

It appears from the experience of the writer, that the lower leaflets show a good deal of movement and that such movement is due to the rapid wilting of the leaf. There is a curious feature of the phenomenon, however, in the fact that the lessening of the distance between the leaflet tips is not due to a general curvature in those parts, at least in the early part of the process, but rather to a more local, and therefore stronger, curvature at the base of each leaflet.

The matter would seem not unworthy of further examination. We still are unable to answer the curious in regard to the origin of the specific name; nevertheless, that the leaf is "sensitive" appears doubtless true. "Squeezing the stem" has, however, nothing to do with it.

Spore Expulsion in Webera (*Diphyscium*) *sessilis.*—The peculiar, dorsiventral form assumed by the sporogonium of this plant is, according to Goebel, assumed under the influence of one-sided illumination. This was shown by cultivating the young sporogonia, which are radially symmetrical under appropriate conditions. The same author explains the form of this organ teleologically as an arrangement by which the dissemination is facilitated by falling raindrops.*

By tapping the upper side of a dry ripe capsule with a pencil point the action of the raindrop falling upon it may be imitated. In this way I have been able to see a puff of spores shot out very rapidly to a distance of two inches. Doubtless the natural conditions result still more favorably. The behavior is sufficiently striking, however, as it stands.

A KEY TO THE NORTH AMERICAN SPECIES OF CORTINARIUS.—II†

By F. S. Earle

Inoloma

1.	Lamellae at first white or pallid.	2.
	Lamellae at first violaceous (as also the stipe and cortina).	4.
	Lamellae at first yellow, red, or cinnamon.	11.

* Organography (translation), p. 237.

† Continued from page 172.

2.	Stipe colored like the pileus, hollow.	*C. modestus* Pk.
	Stipe white.	3.
3.	Pileus subferruginous; lamellae crowded.	*C. caespitosus* Pk.
	Pileus whitish, then reddish-yellow; lamellae subdistant.	*C. canescens* Pk.
4.	Pileus light bluish or lilac.	5.
	Pileus dark bluish, violet or purple.	*C. violaceus* (L.) Fr.
	Pileus no shade of blue or violet.	6.
5.	Stipe strongly bulbous.	*C. lilacinus* Pk.
	Stipe subconic or clavate, not bulbous.	*C. albo-violaceus* (Pers.).
6.	Stipe light-colored or whitish, at least below.	7.
	Stipe darker, sub-concolorous.	9.
7.	Pileus grayish or whitish tinged with red.	8.
	Pileus brownish-gray.	*C. erraticus* Pk.
8.	Pileus nearly white; lamellae bright deep violet.	*C. pulchrifolius* Pk.
	Pileus darker; lamellae dingy violet.	*C. rubro-cinereus* Pk.
9.	Pileus scaly.	10.
	Pileus silky-fibrillose, reddish-brown.	*C. Clintonianus* Pk.
10.	Pileus fawn-color with blackish scales.	*C. pholideus* Fr.
	Pileus ochraceous with brown scales.	*C. asper* Pk.
11.	Pileus yellow or ochraceous.	12.
	Pileus cinnamon or ferruginous.	13.
	Pileus red or reddish-brown.	14.
12.	Pileus smooth.	*C. ochraceus* Pk.
	Pileus squamulose.	*C. annulatus* Pk.
13.	Pileus nearly smooth.	*C. Catskillensis* Pk.
	Pileus densely fibrillose-squamulose.	*C. squamulosus* Pk.
14.	Pileus smooth, glabrous.	*C. robustus* Pk.
	Pileus fibrillate.	15.
15.	Flesh pallid; odor of radishes.	*C. craticius* Fr.
	Flesh white; odor none.	*C. autumnalis* Pk.

TELAMONIA

1.	Lamellae thick, rather distant; stipe spongy or fibrous.	Section *Platyphylli*.
	Lamellae thin, narrow, crowded; pileus thin; stipe hollow, subcartilaginous.	Section *Leptophylli*.

Platyphylli

1.	Stipe and veil white.	2.
	Stipe and lamellae violet, cortina light violet, veil white.	6.
	Stipe and veil red or yellow; lamellae cinnamon.	7.
	Stipe brown; lamellae dark, brownish.	9.
2.	Pileus pale gray.	*C. griseus* Pk.
	Pileus dark brown.	3.
3.	Lamellae at first ferruginous.	*C. gracilis* Pk.
	Lamellae at first yellow.	4.
4.	Stipe solid.	*C. flavifolius* Pk.
	Stipe stuffed or hollow.	5.

5. Pileus conic to convex, umbonate. — *C. badius* Pk.
Pileus convex to expanded. — *C. castaneoides* Pk.

6. Pileus violaceous to brick-red. — *C. torvus* Fr.
Pileus violaceous to grayish-red. — *C. torvus nobilis* Pk.

7. Lamellae linear ; pileus bay or brick red. — *C. Robinsonii* Mont.
Lamellae broad. — 8.

8. Stipe yellow. — *C. paludosus* Pk.
Stipe reddish, or whitish with two to four red zones. — *C. armellatus* (A. & S.) Fr.

9. Lamellae purplish-brown ; pileus dark brown to pallid. — *C. adustus* Pk.
Lamellae brown or yellow-brown. — 10.

10. Stipe long, 5–8 cm.; pileus bay-brown to fulvous. — *C. distans* Pk.
Stipe shorter, 2½–5 cm.; pileus fuscous to ochraceous. — *C. furfurellus* Pk.

Leptophylli

1. Stipe white or pallid. — 2.
Stipe violescent. — *C. subflexipes* Pk.
Stipe brown. — 3.

2. Pileus blackish chestnut, paler when dry. — *C. nigrellus* Pk.
Pileus watery cinnamon, paler when dry. — *C. lignarius* Pk.

3. Pileus densely fibrillate. — *C. hemitrichus* (Pers.) Fr.
Pileus canescent, then glabrate and rimose. — *C. iliopodius* (Bull.) Fr.

DERMOCYBE

1. Lamellae at first white or pallid. — 2.
Lamellae at first violet or purple. — 5.
Lamellae at first yellow, red or cinnamon. — 7.
Lamellae at first dark brown or olivaceous. — 13.

2. Pileus white or pallid. — 3.
Pileus dark brown. — 4.

3. Lamellae crowded. — *C. ochroleucus* (Schaeff.) Fr.
Lamellae subdistant. — *C. albidifolius* Pk.

4. Pileus subglabrous. — *C. sericeps* Pk.
Pileus with minute brown scales. — *C. tigrinus* Johns.

5. Pileus grayish-violet when young. — 6.
Pileus argillaceous. — *C. brevissimus* Pk.
Pileus dark reddish-brown. — *C. anomalus* Fr.

6. Lamellae subcrowded. — *C. simulans* Pk.
Lamellae distant. — *C. rimosus* Pk.

7. Lamellae and cortina red. — 8.
Lamellae yellow or brown. — 9.

8. Entire plant cinnabar red. — *C. cinnabarinus* Fr.
Entire plant blood red. — *C. sanguineus* (Wulf.) Fr.

9. Pileus yellow. — *C. luteus* Pk.
Pileus dark chestnut. — *C. castanellus* Pk.
Pileus cinnamon or tawny brown. — 10.

10. Cortina forming a webby basal annulus. — *C. basalis* Pk.
Cortina not forming a basal annulus. — 11.

11. Spores large, $11–13 \mu \times 4–5 \mu$. — *C. aureifolius* Pk.
Spores smaller, $7–8 \mu \times 4–6 \mu$. — 12.

12. Stipe long, 5-8 cm. — *C. cinnamomeus* (L.) Fr.
Stipe short, 1½–2½ cm. — *C. Sintenisii* Bres.

13. Stipe white. — *C. appendiculatus* Johns.
Stipe concolorous. — *C. lutescens* Pk.

HYDROCYBE

1. Pileus somewhat fleshy, margin incurved when young; stipe attenuate above. — Section *Firmiores*.
Pileus submembranous, margin straight from the first; stipe subcylindric or attenuate below. — Section *Tenuiores*.

Firmiores

1. Stipe white, cortina colored like pileus. — 2.
Stipe and lamellae violaceous. — 3.
Stipe and subobsolete veil yellow or reddish. — 4.
Stipe brown; cortina white or pallid; lamellae dark. — 5.

2. Lamellae at first pallid. — *C. armeniacus* (Schaeff.) Fr.
Lamellae at first violaceous. — *C. regularis* Pk.

3. Stipe smooth, glabrous. — *C. castaneus* (Bull.) Fr.
Stipe fibrillose. — *C. fusco-violaceus* Pk.

4. Small; pileus 1–2 cm.; in pastures. — *C. vernalis* Pk.
Larger; pileus 2½–4 cm.; in woods. — *C. pulcher* Pk.

5. Small; pileus 1–3½ cm.; on ground in woods. — *C. praepallens* Pk.
Large; pileus 10 cm.; on logs. — *C. rubidus* Mont.

Tenuiores

1. Pileus bay-brown, disc darker. — *C. decipiens* (Pers.) Fr.
Pileus pale alutaceous, darker when dry. — *C. pallidus* Pk.

Not able to place — *C. venosus* Johns.

NEW YORK BOTANICAL GARDEN.

PETIOLATE CONNATION IN TRIFOLIUM PRATENSE

BY CHARLES A. WHITE

Among the autumn stools of *Trifolium pratense* growing upon my house-lot in Washington I discovered in October last a leaf consisting of five leaflets and an unusually strong petiole. It was the fifth and innermost one of the five leaves which were then borne upon one of the six sprouts constituting the stool. All the other leaves of that stool, and all those of the many other stools which I examined bore only the normal number of three leaflets each. Supposing this leaf to have been a foliate variation similar to that which has become the race character of Professor

de Vries's *T. pratense quinquefolium*, I potted the whole stool upon which it grew for further observation. The following remarks, however, refer only to the leaves of that sprout which bore the leaf with five leaflets just mentioned. A few days after the plant was potted a new leaf, number 6, appeared from between the infolded stipules of number 5 and upon the same side of the axis of the sprout. This leaf consisted of six leaflets and, like number 5, it had a strong petiole with a shallow median groove along its upper side; and a cross section showed that the internal canal was double. Number 7 soon came out on the opposite side of the sprout and bore only three leaflets. Number 8 came out on the same as numbers 5 and 6, bearing six leaflets upon a petiole like that of each of those numbers. Only these three abnormal leaves appeared and they were preceded and followed by normal leaves on the sprout that bore them. The structure of the petiole of each plainly shows connation, and it necessarily follows that the leaflets in excess of three were not supernumeraries, but normal leaflets of one of the two petioles which are thus represented. The double character of these three petioles was easily traceable from the leaflets to the stipules but there it disappeared, and I found no trace of duplication of the stipules. The connation in number 6 extended to the two middle petiolules of the leaflet cluster and also to the lower part of the two leaflet blades which they bore; but in numbers 5 and 8 all the leaflets and petiolules were fully separate. I assume that one of the leaflets of number 5 was aborted. These three abnormal leaves are evidently monstrosities and not such cases of true multiplication of leaflets as occur in *T. pratense quinquefolium* and in ordinary four-leafed clover. The leaves here referred to, numbers 5, 6, 7, and 8, are preserved in the herbarium of the U. S. National Museum.

WASHINGTON, D. C.,
November, 1902.

REVIEWS

A new Index to Botanical Literature

Under the auspices of the Royal Society of London, an International Catalogue of Scientific Literature was begun with the opening of the twentieth century. The first issue of Section

M, Botany, for 1901 has just been received, though it is dated May 1902. It is a small octavo of 378 pages giving: (1) An author's catalogue in which the titles of something like 2,100 botanical papers issued during last year are listed, followed by (2) A subject catalogue in which the same titles appear under one or more topics arranged on a numerical system which is practically a reclassification of the Dewey system with the points omitted. Under each of the major divisions of the subject Taxonomy occur lists of new species published in the papers cited.

As the Society announces the further issuance of a second part during the year to complete the record of the world's botanical literature for 1901, they have for the present disarmed criticism along a very important line, namely completeness. As the annual output of botanical literature during the past decade has ranged from 5,000 to 8,000 titles, it will be necessary for the second part to be considerably larger than the present one. Taking a random half dozen well-known American contributors whose titles for 1901 have been published elsewhere, the present volume gives less than one half of their contributions to botany, and for some not over one third of them.

The enormous work entered upon by the Society can better be seen when we learn that botany is only one of the seventeen subjects whose literature is being listed in this series of publications.

The strongest criticism that can be made on the system aside from the question of completeness is that it is a book instead of a card catalogue. When, for example, the year 1925 is reached, not to look farther into the future, one will be obliged to consult twenty-five individual author catalogues to find a given article by any desired author unless its exact date is known in advance. One will be obliged to consult the same number of subject catalogues to find the summary of literature on any one subject, as, *e. g.*, the Hepaticae, for the period covered. Until the European library system attains the efficiency of the American in adopting the standard card catalogue, such a publication may involve practical difficulties, but it is the only

solution of the index problem. The literature relating to American botany has now been indexed since 1894 on the card system; by purchasing duplicate cards each library can adopt the subject catalogue suited to its own needs which are sure to vary according to the size, purpose, and character of the library. Under the card system, however long the index is continued, there will be simply one place to search for any paper by any author; the example of Just's Jahresbericht, hitherto our most valuable index for the world's literature, has demonstrated the practical inutility of the annual volume as an index guide. Life is too short to be forced to waste time consulting annual volumes when there is an infinitely simpler way. LUCIEN M. UNDERWOOD.

PROCEEDINGS OF THE CLUB

TUESDAY, OCTOBER 14, 1902

The meeting was held at the College of Pharmacy; 13 present; Dr. Britton in the chair.

The scientific program consisted of informal reports of summer work and observations.

The secretary spoke of his collections of asters, also of *Euphrasia* and other alpine plants in the White Mountains. Discussion regarding Wettstein's monograph of *Euphrasia* followed.

Professor Lloyd reported various observations made during the summer, which are being published in the current numbers of TORREYA.

Dr. Tracy E. Hazen reported observations about St. Johnsbury, Vt., on the black maple, *Acer nigrum*. He maintained its specific distinctness from the sugar maple. Dr. Britton confirmed its distinctness as seen in other parts of western New England and in western New York. Its leaves are darker beneath and are said to expand about two weeks later in spring, its fruit is much larger and there seems to be a difference in the angle of divergence of the keys.

Miss F. A. Mulford spoke of the flora of the Hempstead plains, on Long Island, remarking on certain similarities to that of Kansas.

Miss Mary E. S. Davidson reported observations when at Wood's Hole this summer, upon an interesting green fungus, new to that region, a *Lactarius*.

Miss Catharine Murray spoke of her visit to the botanical gardens at Kew, Brussels, Paris, etc.

Mr. Eugene Smith, Miss L. K. Lawall, and others, spoke of a number of localities for the fringed gentian near New York, and of an increased attendance upon the summer excursions.

Dr. MacDougal remarked upon the dissimilarity of the alpine conditions of the Rockies from those of the White Mountains. Tracts which in July in the rains of the White Mountains are covered merely with green would have been blazing with flowers if in the Rockies.

Dr. Underwood spoke of the recognition among farmers about Redding, Ct., of two types of the sweet flag, *Acorus Calamus* L., that with a white root being in favor, that with a red root being smaller and somewhat bitter, and with young leaves of a different tone of color.

Dr. Underwood also mentioned his finding young plants of the date-palm coming up in railway rubble at South Norwalk, Ct.; similarly observed on garbage-heaps about New York by Mr. Eugene Smith. He spoke also of the successful cultivation on a lawn at Danbury, Ct., of our native orchid *Cypripedium reginae* Walt., where in four years a cluster of three or four plants has increased to forty.

Dr. Underwood also referred to the Torrey Club's Fourth of July excursion, when the Botanical Club of Syracuse provided generous entertainment. The saline plants about Onondaga Lake are disappearing and the refuse from the soda-ash process is gradually filling up the lake. Where such plants as *Salicornia* once occurred by the acre, there are now but few plants remaining.

He referred also to his finding that *Botrychium neglectum* and *B. lanceolatum* still survive in the original locality where he first found these small species some twenty-five years ago.

Mrs. Britton reported upon observations on an interesting *Vittaria* brought by Dr. Evans from Porto Rico; and upon forms of *Stachys* found by her on Hempstead Plains in Long Island.

In a white cedar swamp there she observed the newly recognized fern *Dryopteris simulata* growing in great masses and abundantly distinct.

Mrs. Britton spoke also of certain instances of new habit assumed by mosses on adopting a new habitat as in a *Leptodon* usually on trees, latterly found in tufts on dry rocks; and in case of *Porotrichum Alleghaniense*, at Green Lake, Jamesville, New York, an aquatic form surviving the desiccation of the rock surfaces, and now assuming the habit of a *Climacium*.

Dr. Britton, whose summer was largely given to administrative work, secured time for attendance upon the Association meetings at Pittsburg, and for prosecution of his studies on the Cyperaceae and the Crassulaceae at Kew. Nearly half of the known species of North American Crassulaceae are now growing in Washington or at the New York Botanical Garden, a necessary preliminary to proper descriptive work with these plants. The fleshy foliage and calyx require description from the life, not, as often hitherto, from herbarium specimens. Many of the numerous Mexican Crassulaceae are very local, and known only from one or two localities.

Discussion followed upon the effects of the prolonged wet weather of the present season, Dr. Hazen remarking upon sedges in Vermont which are usually stiff but this year were very long and decumbent.

EDWARD S. BURGESS,
Secretary.

WEDNESDAY, OCTOBER 29, 1902

The meeting was held at the Botanical Garden at 3:30 P. M.; 20 persons present; Dr. MacDougal in the chair.

Professor D. S. Johnson, of the Johns Hopkins University, was elected to active membership.

Two resignations were accepted: Mrs. Francis S. Parsons, Albany, and Miss Mary T. Pitman, Providence.

The scientific program followed: The first paper presented was by Miss F. A. Mulford, "Remarks on *Gerardia decemloba*, Greene, with exhibition of specimens." The plant was found at Hempstead, Long Island, September 5, 1902. This is the second station for the species; it was first found by Professor

Greene at Washington, D. C., in 1898. Dr. Britton followed with remarks upon the peculiar physiography of the Hempstead plain, its isolation, and the lack of trees, which is perhaps due to fires.

The second paper was by Miss Anna Murray Vail on "Some rare Books recently added to the Library of the New York Botanical Garden." This will shortly appear in the *Journal of the New York Botanical Garden.* Among some 400 works of the older botany recently procured, and now exhibited to the Club, the oldest is a fifteenth century MS. of Macer Floridus *De virtutibus herbarum*, in Gothic letters. The oldest printed volume is one of the Ortus Sanitatis, from the end of the fifteenth century; the next, the Venice edition of 1509 of the *Aggregator practicus*, one of the herbals often known simply as *Herbarius.* Later notable works secured, include many of those of Mattioli, Dodoens, and Lobel; the rare first volumes issued by Dodoens (his *De frugum Historia*, 1552) and by Clusius (1557); also a copy of Clusius' greatest work, his *Rariorum* of 1601, of special interest because a presentation copy from Clusius himself. Rarities include a Passaeus of 1614, and the elephant folio of the *Hortus Eystettensis* of 1613, in unusually fine preservation. There is a fine copy of Rivinus of 1690; and one of Linnaeus' rarest works, his autobiographical pamphlet of 1741, "*Orbis eruditi judicium*," believed to exist in only four copies.

The third paper was by Dr. Rydberg, a "Review of a recent Monograph of *Campanula rotundifolia* and its Allies." In the discussion of the paper Dr. MacDougal called attention to the work of Goebel on this plant, saying that Goebel had been able to produce rounded leaves on *Campanula*, by experiment, and in any part other than the inflorescence, but that it had not been possible to prevent the formation of the rounded basal leaves.

The final paper was given by Dr. Arthur Hollick on "Buried swamp Deposits of Maryland." Along the shores of the Chesapeake Bay swamp deposits of the Pleistocene era are being uncovered by water action. These occur under from five to thirty feet of gravels. Among the vegetable remains discovered, there were described and shown stumps of the bald cypress, cones of

two species of *Pinus* (*P. echinata* and *P. Strobus*), and beech and hickory nuts. Many seeds are now being determined by experts of the Department of Agriculture. When the determination of the seeds is completed a good account of the ancient flora of that region can be given. A comparison of the living with the fossil plants of the locality shows that, except for the cypress, the plants now growing seem the same as those there in Pleistocene time.

In discussing the conditions attendant on the formation of the ancient flora and its disappearance, Dr. Hollick stated that the land had undergone elevation twice and subsidence twice. The first elevation preceded the formation of the flora, which was to be found mainly in the valleys. The area was then depressed and completely submerged, and at length was covered by sand brought in by the waves. After the first elevation and during the first subsidence deposits were formed either *in situ*, as swamps, or at the mouths of the valleys by transported material. These after the second elevation are now being exposed by erosion. The second subsidence is now taking place, and a second series of vegetable deposits is being laid down. The rate of this subsidence has been calculated to be about two feet in the century.

EDWARD S. BURGESS,
Secretary.

NEWS ITEMS

Mr. Homer D. House, Syracuse University, 1902, has entered Columbia University as a graduate student in botany.

Professor A. D. Selby, botanist of the Ohio Agricultural Experiment Station, is carrying on some special lines of research at the New York Botanical Garden.

The editor of *Torreya* spent the greater part of the months of October and November in Florida, studying and collecting the marine algae of that region.

A suggestive nature study leaflet entitled "Plant-Travellers" has recently been issued by Professor Clarence Moores Weed, of the New Hampshire Agricultural Experiment Station.

The large collection of West Indian and South American ferns accumulated by the late George S. Jenman, of Georgetown, British Guiana, has been purchased by the New York Botanical Garden.

Dr. Frederic E. Clements and wife, of the University of Nebraska, have recently devoted a few weeks to consulting the herbarium and library of Columbia University and the New York Botanical Garden.

Mr. R. S. Williams is again at the New York Botanical Garden after a year and a half spent in Bolivia where he has made extensive collections of plants. His gatherings are particularly rich in bryophytes and ferns.

Dr. William Austin Cannon, of the New York Botanical Garden, has been awarded a grant of five hundred dollars by the Carnegie Institution for the completion of cytological researches relating especially to the oögenesis, spermatogenesis and fertilization of certain plant hybrids.

Professor F. S. Earle returned to New York on December 2 from a six weeks' visit to the island of Jamaica. He was especially occupied while there in gathering data for a study of the diseases of logwood, cocoanut, and other plants of economic importance.

Among the botanists visiting New York in the past few weeks have been Professor Treub, Director of the Botanical Garden at Buitenzorg, Java; Professor F. E. Weiss of the Owens College, Manchester, England; and Professors Lester F. Ward and F. H. Knowlton, of Washington, D. C.

The American Association for the Advancement of Science, the Botanical Society of America, the Society for Plant Morphology and Physiology, and the Botanists of the Central and Western States all hold meetings in Washington, D. C., during "Convocation Week," December 27, 1902, to January 3, 1903.

The *Revue Bryologique* announces the death of the distinguished bryologist, K. Gustav Limpricht, which occured at Breslau on the 20th of October in his 69th year. Limpricht was best known by his masterly treatment of the Musci of Germany, Austria, and Switzerland in Rabenhorst's Kryptogamen-Flora. His writings on the Hepaticae also are important and thorough-going.

"The Ulothricaceae and Chaetophoraceae of the United States," by Dr. Tracy Elliot Hazen, comprising Vol. 11, No. 2, of the Memoirs of the Torrey Botanical Club, was issued in

October; the "History of Pre-Clusian Botany in its Relation to Aster," by Dr. Edward Sandford Burgess, constituting Vol. 10 of the Memoirs, was published in November; and the "Flora of New Providence and Andros (Bahama Islands)" by Mrs. Alice R. Northrop, forming No. 1 of Vol. 12 of this series, was issued December 10.

Messrs. Charles Humphrey Bissell and Luman Andrews have recently published a "Flora of the Town of Southington and its Vicinity: A List of the Fern and Seed Plants growing without Cultivation." In an area of approximately thirty-six square miles 1,201 species are listed. An interesting comparison is made, by families, with the 1,563 species reported in the Flora of Vermont published in 1900.

The death of Dr. Timothy Field Allen occurred at his home in New York on December 5, after an illness of many months. He was born in Westminster, Vt., April 24, 1837. Dr. Allen was not only distinguished in his profession as a physician and surgeon, but was also for many years the leading American student of the Characeae. An account of his collections of Characeae, which he presented to the New York Botanical Garden about two years ago, was published in the *Journal* of the Garden for April, 1901. Dr. Allen was a charter member of the Torrey Botanical Club and had been for many years its senior Vice-President. It is expected that a more extended notice of his life and work will appear in an early number of the *Bulletin* of the Club.

ERRATA, VOLUME 2

Page 49, 11th line, *for* writter, *read* writer.
Page 69, 1st line, *for* Berolensis, *read* Berolinensis.
Page 72, 25th line, *for* humosa, *read* humerosa.
Page 96, 3d line, *for* Planting, *read* Plant.
Page 173, 7th line, *for* microsporangia, *read* macrosporangia.
Page 173, 8th line, *for* microspores, *read* macrospores.

INDEX TO VOLUME II

New names and the names of new genera and species are printed in **boldface type**.